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ABSTRACT

The first of two reports in this document details the use of a trial teletext service in residential Washington, D.C. during the second half of 1981. It is emphasized that caution must be exercised in interpreting the results since the trial was designed as a pilot with a sample of only 40 households. In addition, there were significant technical problems, as is often the case with trials of new services. The primary objectives of the pilot field trial were to refine the research hypotheses and develop the research design for a larger field trial. The introductory chapter summarizes features important to the context of the results reported: characteristics of the residential sample; terminal equipment; content of the service; survey and measuring instruments; and consequent limits to the generality of the results. Three additional chapters are devoted to use of the service as measured by meters; residential users' attitudes toward the service as determined by interviews; and a summary of the implications. The second report is concerned with the same population of residential viewers' use of the teletext service broadcast in collaboration with WETA-TV during the first half of 1982 after substantial revisions had been made in the original system. This report focuses on the content of the service, the measuring instruments used, and limits to the generality of the findings. Two topics are covered that were not addressed in the previous report: use of index pages and respondents' willingness to pay for teletext. A concluding statement reviews the implications of the findings for the design of a teletext service, the technical design, and research methodology, and offers some tentative conclusions based on the initial analysis of the data. References, a copy of a questionnaire, and a statistical summary are appended. (THC)

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THE FIRST SIX MONTHS OF A PILOT TELETEXT SERVICE:

INTERIM RESULTS ON UTILIZATION AND ATTITUDES

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The trial has been conducted in collaboration with WETA-TV. The equipment was purchased from the Canadian Department of Communications, which has generously provided all manner of additional assistance.

This support is acknowledged with gratitude. However, the findings and judgements presented in this paper are solely the responsibility of its authors.

SUMMARY

This publication continues the series of working papers reporting interim results from our teletext research program. It covers use of the trial service (as measured by meters) and attitudes towards the service (as determined by interviews) during the second half of 1981. Results for the first half of 1982 will be reported in another paper, as will findings concerning use of the service in public locations.

Caution must be exercised in interpreting the results. The trial was designed as a pilot with a sample of only 40 households. In addition, as is so often the case with trials of new services, there were significant technical problems. Especially during the first months of the trial, they affected both the quality of the service and the completeness of the data. Nevertheless, we consider that even the interim results presented here can provide valuable guidance to others who are trying to understand how teletext can and will be used.

The following are among the more interesting findings. The total level of use of any category of content (e.g., news, weather and so on) was closely related to three variables: number of pages in a category, frequency of updating, and a measure of viewers' attitudes. Reactions to graphics were positive, but viewers were unhappy about access delays. After the first two months, the level of use fell off considerably. Some tentative implications of these and other findings are put forward in the final chapter. Further consideration of the implications awaits the completion of analyses which are still in progress.

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1. INTRODUCTION

1.1 Purpose and Content of the Paper

This paper continues the series of working papers reporting interim results of our research program on broadcast teletext. It is the first to report on residential viewers' use of the service broadcast in collaboration with WETA-TV in Washington, D.C. and their attitudes towards the service. It covers the period from the start of operations in June, 1981 through the end of the year.

The purpose and design of the research program as a whole have been described in earlier papers and will not be repeated here. (See, in particular, Working Paper Number One.) It is, however, appropriate to emphasize that this year of operations was designed as a pilot field trial. The primary objectives were (1) the refinement of research hypotheses and (2) the development of the research design for a larger field trial. We are obtaining a number of suggestive results which meet the first objective, but they cannot be regarded as definitive given the design of the pilot.

Major structural changes were made in the pilot service at the start of January, 1982. A forthcoming paper will report on residential usage and attitudes in the following five months. Another paper will review the behavior, use and attitudes of those who encountered teletext in public locations during the full 12-month period.

The remainder of this section will summarize certain features which are important in setting our results in context: characteristics of the residential sample; terminal equipment; content of the service; survey and measuring instruments; and consequent limits to the generality of our results. The three following chapters are devoted to the use of the service, attitudes towards it, and a summary of implications.

1.2 The Residential Sample

The constraint on the size of our sample was, originally, cost. We purchased 64 teletext terminals.* Of these, 40 were to be placed in people's homes and 10 in public locations. The remainder were required by the production team, primarily as back-up units, for location at sites where teletext pages were designed, and for monitoring the service from their homes.

If the selection of the residential sample had gone according to plan, we would have

(i) selected three geographical areas - one relatively poor, one about average, one relatively affluent - in which engineering tests showed reception to be good.

(ii) sought volunteer households within each area by an invitation mailed to a random sample of individuals.

(iii) selected matched pairs of households from the respondents, assigning one as a teletext household and the other as its control.

The intended procedure was somewhat elaborate for a pilot. We decided on it since we wished to see what practical problems might arise in a rigorously designed trial in which considerable care would be needed in the selection of the sample. In addition, we considered that the extra effort would be justified by the increased power it would offer us in interpreting any findings. Of course, there was little point in seeking a representative sample; too little was known to define the universe of which it should be representative.

An invitation to participate in the pilot, with a short questionnaire relating to household characteristics, was mailed to 1100 randomly selected individuals by a local survey research firm. (Participation would be entirely without cost to viewers, but they would be expected to provide interview information on three or four occasions.) About 200 people responded, expressing an interest in receiving a teletext terminal.

Sample and control groups were chosen from those residing in parts

* Each terminal comprised an Electrohome television set, a Telidon teletext decoder, and a meter to record page accesses.

of Anacostia,Adams Morgan, Brookland and Chevy Chase where engineering tests conducted for us by the Communications Research Center, had suggested that reception would be satisfactory. However, test procedures relating to reception criteria had not yet been fully developed. It turned out that very few of the chosen households enjoyed adequate reception.*

Time was pressing; technical problems had already delayed the project. We decided to relax the criteria for the selection of a household sample. We solicited participation by telephoning WETA subscribers and by distributing flyers within an apartment complex at which reception was good.

In this way, we assembled 40 households at which teletext terminals were installed. We decided to do without a control group. Table 1 summarizes information about these households.

Subjects resided in Alexandria, Anacostia, Chevy Chase, and Georgetown. They were predominantly upper middle class, well-educated, professional and white. (Three families were black.) 78% had a household income of at least $30,000 a year; 75% owned their homes; 68% had at least one member of the family with a graduate degree; 85% were subscribers to WETA. Of the 40 families, 12 had only one adult member, and, of them, two were single-parent families.

The sample was, then, decidedly atypical of the Washington, D.C. area. It was,however, probably fairly typical of those who will be the early users of teletext.

* Problems arising in installation of the equipment are to be expected at the start of a field trial, in particular a pilot. They may have nothing to do with the validity of the concept underlying the design of the technical system or the skill with which the project is implemented. In this project, technical difficulties probably related to (1) the fact that ours were very early production models, (2) special modifications we required for metering purposes, and (3) the fit between the teletext system and WETA's transmission system. Certain technical aspects of the project are discussed in Schober, G., "The Teletext Field Trial in Washington, D.C.: Technical Background and Issues" and in Working Paper Number One.

TABLE 1

Characteristics of the Residential Sample

Location

Chevy Chase ... 13 Georgetown ... 11 Anacostia ... 8 Alexandria ... 8

Household Income

$10-30,000 ... 9 More than $30,000 ... 31

Highest Education Level in Household

High School ... 2 College ... 11 Graduate School ... 27

Number of Children

Zero ... 27 One ... 5 Two ... 6 Three ... 1 Five ... 1

Occupation

Managerial ... 5 Professional ... 31 Retired ... 4

Number of Adults in Household

One ... 12* Two ... 25 Three ... 3

Type of Accommodation

Own ... 30 Rent ... 10

Number of TV's in Home

Zero ... 1 One ... 15 Two ... 12 Three ... 8 Four or more ... 4

* includes two single parent household

TABLE 1

Characteristics of the Residential Sample (con't)

Number of Hours of Daily TV Viewing

Less than 1 hour ... 1 1-4 hours ... 25 More than 4 hours ... 13

Use of High Technology

Video Games ... 7** Home Computers ... 4 Videotape Recorder ... 5

Use of Newspapers

Post only ... 21 Post and Star ... 13 Post, Star and others ... 4
Post and others ... 1 Star and others ... 1

** The total number of families is less than 16 due to double counting

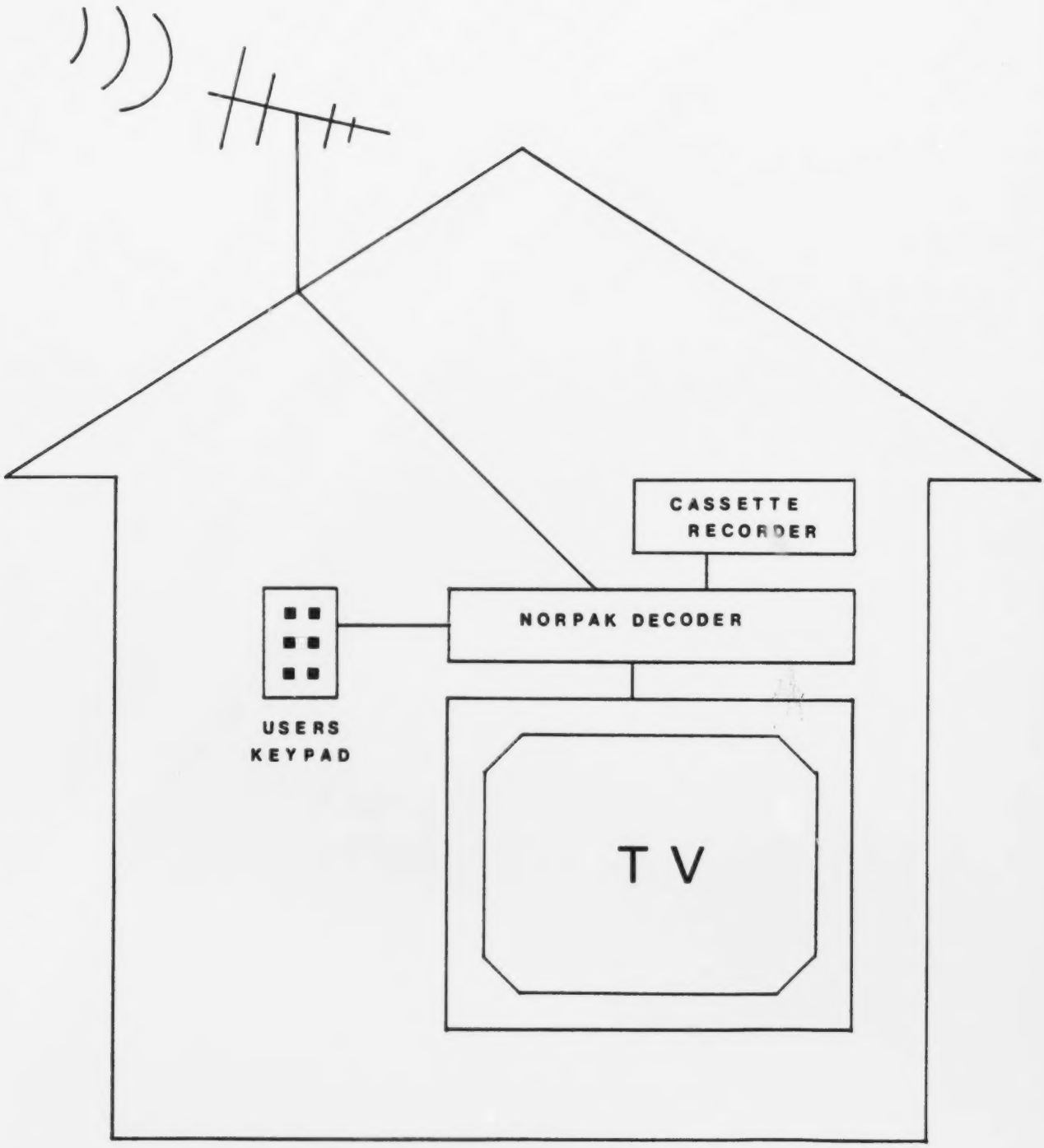


FIGURE 1: Typical Home Teletext Installation

1.3 Terminal Equipment

Figure 1 depicts the components of the equipment located in viewers' homes. To access teletext, viewers had to turn manually to Channel 26 (WETA) and then depress the "TV/Teletext" button on the keypad. This caused the main index page to appear. To obtain any other page, it was necessary to key in its number and depress the "Go" button. The keypad was attached to the decoder by a cable. The decoder was placed on top of the television set.

Also attached by cable to the decoder was an audio cassette recorder on which were recorded the date, time and page number, whenever a page was accessed. The recorder was often placed on the floor under. It, too, needed to be plugged into the AC outlet.

Outdoor antennas were needed to receive teletext. In many cases, we had to have these installed.

As reported in Working Paper Number One, the average duration of the teletext cycle was between 20 and 22 seconds through December 1981. There were about 110 pages in the cycle.

1.3.1 Human factors and related considerations. Certain features of the equipment should be noted, since they may have affected usage and attitudes. We understand that many of those which are deficiencies have been corrected in later generations of hardward; obviously there is a price to be paid for using units which are early off the production line. Other problems stemmed from our need to meter use, a need which was specific to this project and which required some custom modification of the equipment and associated software.

Salient points are as follows:

(1) The keypad was awkward. The buttons were small and very close together. Many were redundant (for use in a teletext mode). They were poorly labeled.

(2) The keypad could not be used to switch channels. To access teletext, it was necessary to get up and use a knob on the television set to switch to Channel 26; then it was necessary to use the keypad. In some cases, it was also necessary to switch in the outside antenna.

(3) The meter assembly, designed to fit our stringent cost constraints, was not sufficiently robust. It was too easy for the meter to be accidentally disconnected from the outlet or from the decoder. It was too easy for it to be turned off by accidental release of the "On" or "Record" button on the audio cassette recorder. Pets and children were frequently associated with these problems. In addition, the metering assembly contributed to an awkward jumble of wires around the television set.

(4) The television sets needed frequent professional tuning to ensure reception adequate for teletext. An engineer had to visit homes on approximately a five week cycle throughout the project and use a wave-form monitor to retune the sets.

(5) There were serious reception problems through October 1981. From November the problems were under control. They were not solved. Not only was a full time engineer needed for tuning and trouble-shooting but, as late as June, 1982, the research team was confident only that more than 75% of homes were able to receive teletext.

(6) The system is self-aggravating when there are reception problems. Whenever errors exceed a threshold, the page is either not displayed or its display stops in mid-stream. The natural tendency is for viewers to use their keypads, at first systematically and then randomly, to get their service moving again. These additional commands complicate their problems.

(7) Initially, metering requirements conflicted with the use of chaining pages to reduce access delays. Metering required the transmission of time signals from a master clock along with the teletext pages. However, because of an oversight when the metering subsystem was designed for us, when-

ever a time signal was received, it preempted the buffer in the decoder which stored chained pages. The subsystem was redesigned and terminals were retrofitted in November. Until then, some timing data in the meter records had to be sacrificed because of the compromise which had to be struck over the frequency of transmission of time signals. In addition, up to that point the chaining feature was less useful than it could have been in reducing average access delays.

(8) Partly as a result of pressures caused by technological problems, there was not the time to collect the meter tapes from households as frequently as was desirable. Data were lost because tapes had run out some days before they were collected, and also because the interval between accidental disconnection of a meter and its rectification was lengthened.

The combined effect of the above was twofold. First, they reduced the overall quality of the service. It is impossible to quantify the effect this may have had on viewers. (As reported later in this paper, an attempt to relate households' reception problems to their level of use of teletext was inconclusive. But this may have been due to the small sample size and the coarseness of the measure of reception quality.) Second, they made it harder to extract general conclusions about teletext which could provide hypotheses about its use elsewhere.

1.4 Content of the Service

Through December, 1981 there were nine categories of content. Each was led by an index page. The numbers of these second-level index pages were shown on a master index page, which was displayed automatically when the viewer turned to teletext.

The categories are listed and described briefly in Table 2. Given limited staff resources (usually two to three editors/composers for the 55% of pages designed on site) difficult trade-offs had to be made between

TABLE 2

The Teletext Service, June Through December, 1981

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
10-19	NEWS				
	A series of separate news stories	Washington Post	Washington Post	19	Once/day Twice on Monday
20-29	WEATHER				
	Local Regional National Select Cities	National Weather Service	AMC/Washington	5	Once/day (Occasionally twice a day)
	3 Day Forecast Long Range Forecast				Once/month
30-39	BUSINESS/MONEY				
	Business News	Bureau of National Affairs	BNA and AMC/ Washington	9	Once/day
	IRS Tax Tip	Internal Revenue Service	AMC/Washington		Weekly
	Stock Market	Radio	AMC/Washington		Once/day
	Jobs	U.S. Dept. of Labor	AMC/Washington		Once/day

TABLE 2

The Teletext Service, June Through December, 1981 (con't)

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
40-49	SPORTS				
	Scores	New York Daily News	AMC/Washington	5	Once/day
	Stories	AMC			
	Odds	AMC			
50-59	LIBRARY				
	Materials for Children	Martin Luther King Library	AMC/New York	10	Once/week
	Community Events				
	Library Information				
60-69	ENTERTAINMENT				
	Events	Wash. Post	AMC/Washington	21	Once/day
	Horoscope	New York Daily News			
	Mini Movie Review	Daily News			
	Cheap Flicks	Wash. Post			
	Jazz Picks	Wash. Post			

TABLE 2
The Teletext Service, June Through December, 1981 (con't)

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
70-79	CHECKBOOK				
	Local Consumer Information	Consumer Checkbook	AMC/New York	10	Every other week
80-89	FEATURE				
	Wildcard	AMC	AMC/Washington	12	Once/day
	Science	Smithsonian			
	People	New York Daily News			
	Film Reviews	WETA			
	Congressional Insight	Congressional Quarterly			
	Events	WETA			
	Children	MLK Library & Children's Museum			
	Books	American Assoc. of Publishers			
90-99	CONSUMER FOCUS				
	Nine separate consumer tips	General Services Admin.	AMC/New York	9	Once/week
	INDEX PAGES			10	
	TOTAL PAGES			110	

frequency of updating, use of graphics, and in-house development of content (i.e., by the central production team in Washington). It will be noted that the frequency of updating is low. (Time taken to create teletext content was dealt with in Working Paper Number Five.)

1.5 Surveys and Other Measuring Instruments

As noted above, meters were used to collect information automatically on what pages were accessed when. These data are at the level of the household as a whole and cannot be disaggregated further.

A baseline interview, generally with the homemaker, was conducted in each household in May, 1981. Basic demographic information was obtained, as was information relating to the use of television and other media by household members, and their use of other electronic technology.

A second interview survey was conducted in November, 1981. This focussed upon attitudes towards the teletext service. In conjunction with this survey, households were asked to complete diaries for a week, recording each of the first ten pages accessed at each session, as well as information about the viewers present and the television channel in use, if at all, immediately before and after each session.

A third interview survey and diary exercise were conducted in April, 1982, but are not reported upon in this paper.

The interview instruments are in Appendix Two. All interviews were open-ended to allow the collection of possibly relevant observations and anecdotal material.

1.6 Limits to the Generality of the Findings

It is important that the reader be cautious in extrapolating our findings. We regard them mostly as of suggestive, rather than definitive, value.

The following points should be borne in mind:

(1) The sample was small. Its effective size was less than 40. Some households did not value the service enough to use it. (It cost them nothing to have the decoder.) Two households asked for the set to be removed. A few people moved. There was insufficient time available to arrange to move sets quickly into other homes.

(2) The sample cannot be regarded as representative, as noted in 1.2 above. Moreover, it was heavily skewed towards WETA members.

(3) Others may choose to make quite different decisions about such features as the content carried, the way it is treated, the number of pages devoted to each category, use of graphics, frequency of updating, use of chaining, and length of the cycle. In addition, some options were available to us, which are unavailable in certain other systems, and vice versa. So, for example, we were able to create chains of up to 12 pages. As each of these pages was called up, those following it were entered into a local buffer, available for immediate access if the viewer chose them. On the average, four pages could be held in the buffer at one time. On the other hand, we were unable to superimpose teletext over regular television to provide a "Newsflash" service.

(4) Recurrent reception difficulties caused loss of service for some viewers, especially in the early months of the trial. In marginal cases, they increased average access delays. Though less serious, the minor technical problems described in section 1.3.1 should also be noted.

(5) Teletext was available on only one channel. It is reasonable to expect that, in a future context, teletext services will usually be available on several channels.

Provided the caution required by these qualifications is observed, we are confident that useful conclusions can be based on the findings which

will be reported in this and forthcoming working papers. Since some conclusions must be based on comparison of results in the first and second halves of the trial, and others on comparisons between use at home and use in public locations, our emphasis in this paper will be more upon reporting the findings than upon drawing conclusions from them.

2. USE OF TELETEXT

This chapter draws primarily on meter records and, to a small extent, on the November survey data to address the following questions:

- How did the rate of use of teletext vary on a week-to week basis over the six-month period?
- How did it vary on an hour-to hour basis over the day?
- How was use distributed over the nine content categories?
- What was the relationship between frequency of updating and level of use of the different categories?
- What is the pattern of use in terms of number of viewing sessions per month and number of pages accessed per session?
- Is there a relationship between the use of teletext and the use of television?
- Are there differences in utilization among adult males, adult females and children?

2.1 Utilization Through Time

Figure 2 shows the total number of page accesses per week from June 21, 1981 to December 25, 1981. Use declined substantially after the sixth week of the trial, dropping to a fairly steady level at about a quarter of the early peak. Such a pattern is not uncommon for new telecommunication services.* It is not indicative of failure, but is probably due to a "novelty effect."

The decline in usage was more pronounced than the graph suggests. We estimate that from June through September recorded use would have been at least

* Irving, in a study of computer message systems, noted that the number of accesses fell by a factor of three in a few months following their introduction. (R. Irving, "Computer Assisted Communications in a Directorate of the Canadian Federal Government : A Pilot Study," in Evaluating New Telecommunications Services, Elton et al., Plenum, New York, 1978.)

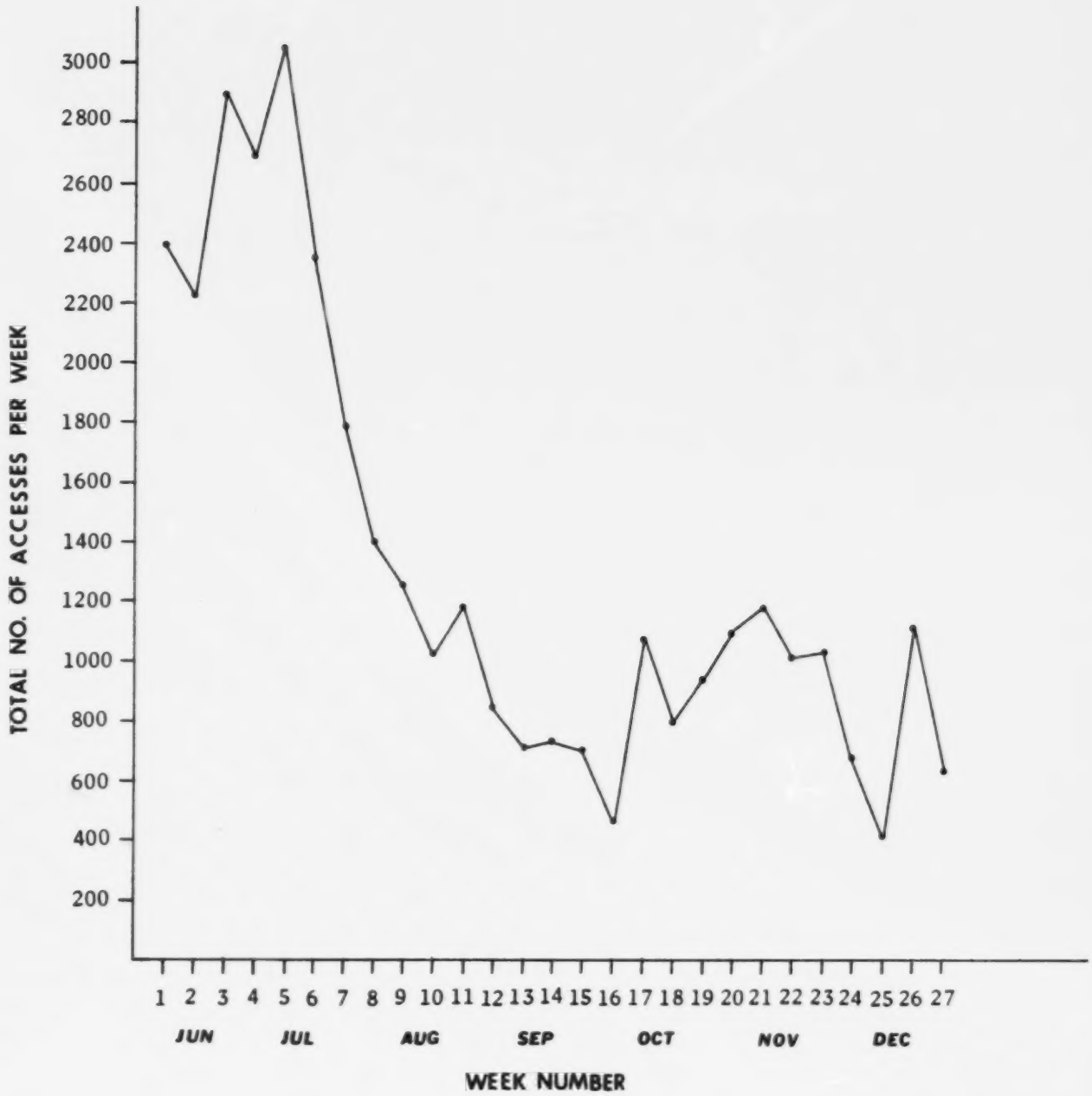


FIGURE 2: Number of Pages Accessed Per Week, June 26 - December 25, 1981

10 to 15% higher if (1) all decoders had been operating properly in the early months; (2) reception problems through September had been at the lower level achieved from October onwards; (3) we had not experienced the problem with the master clock timing signal (described in section 1.3.1 above), which meant that, until about mid-October, some accesses could not be dated.

The decline in August was probably accelerated by summer vacations. The dips in October and early December correspond to times when there were technical problems which affected the transmission of the teletext signal.

It is dangerous to use Figure 2 to estimate the average number of accesses per household. The number of weekly accesses shown was generated by fewer than 40 households. One reason is that some of the sample households dropped out, because they moved, because they asked for the set to be removed or because we moved sets from those who evidently would not use teletext at all. The last column in Table 3 shows the weekly number of households in which a teletext receiver was installed.

The middle column shows the weekly number of households from which meter data were obtained. (The sums of the accesses from these meters are shown in Figure 2.) Unfortunately, there are several possible reasons to account for a lack of meter data and it is not possible to tell for sure which applied to any particular household. (1) The meter may have malfunctioned, or been accidentally disconnected or turned off. (2) The household may have been an <u>involuntary</u> non-user, because reception was inadequate. (3) The household may have been a voluntary non-user, because no one in it wanted to access the service.

We present an alternative approach to estimation of usage per household in section 2.5 below.

TABLE 3
Number of Users by Week

Week No.	No. of Active Meters	No. of Possible Users (Households)
3	26	38
4	23	38
5	23	38
6	16	38
7	12	37
8	11	37
9	15	37
10	12	37
11	17	37
12	13	37
13	12	37
14	15	37
15	13	37
16	12	36
17	20	36
18	13	36
19	17	36
20	23	36
21	20	36
22	17	36
23	14	36
24	13	36
25	14	35
26	16	35
27	10	35

2.2 Utilization Through the Day

The teletext service operated from 8 a.m. until midnight, seven days a week. Figure 3 shows relative usage through the day. More than 50% of the use is in the evening. There is a morning peak at 9-10 a.m. The evening peak is at 5-7 p.m.

2.3 Utilization of Different Content Categories

Figure 4 shows the total number of page accesses for each of the nine content categories in the period from July through December. However, part of the variation may be explained by the fact that some categories were allocated many more pages than others. In recognition of this, the figure also shows what the utilization would have been for each category if the probability of access to a category were directly proportional to the number of pages in it.

Table 4 summarizes, for each category the average number of daily accesses per page. The measure used was not a true average. It was calculated as follows. Since some pages were not active on some days, we derived for each page a measure called its FAD score - i.e., its frequency of access per active day. This was obtained by dividing the total number of accesses over the month by the number of days on which the page was active. The measure used in Table 4 is the arithmetical average of the FAD scores for each page in the category, excluding those pages which were active for less than seven days in the month. A more obvious measure would be the total number of accesses in a month divided by the number of active page-days. The rankings of the categories, which are also shown in Table 4, are not affected by which of these two measures is used.

Note that the measure used in Table 4 is a measure of the average number of accesses per day to each page in the category. It is a measure of the intensity of use, rather than an absolute measure of use. It turns out that

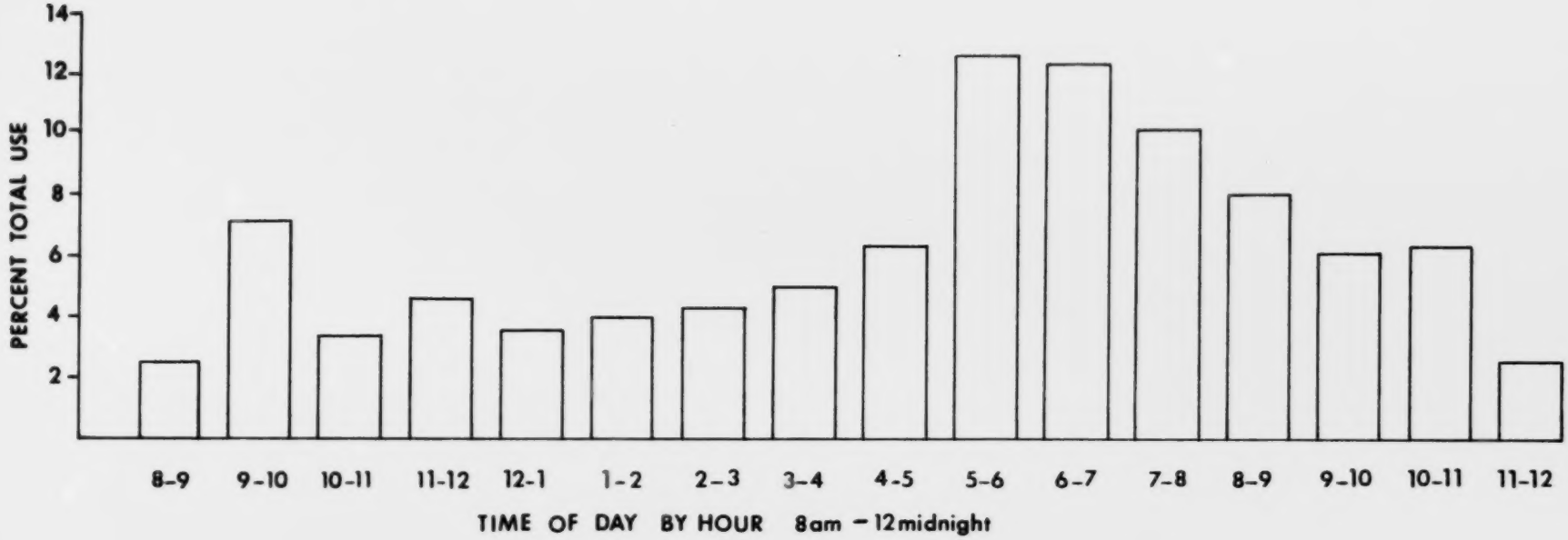


FIGURE 3: Average % of Total Use by Time of Day for All Pages Sept. - Dec. 1981

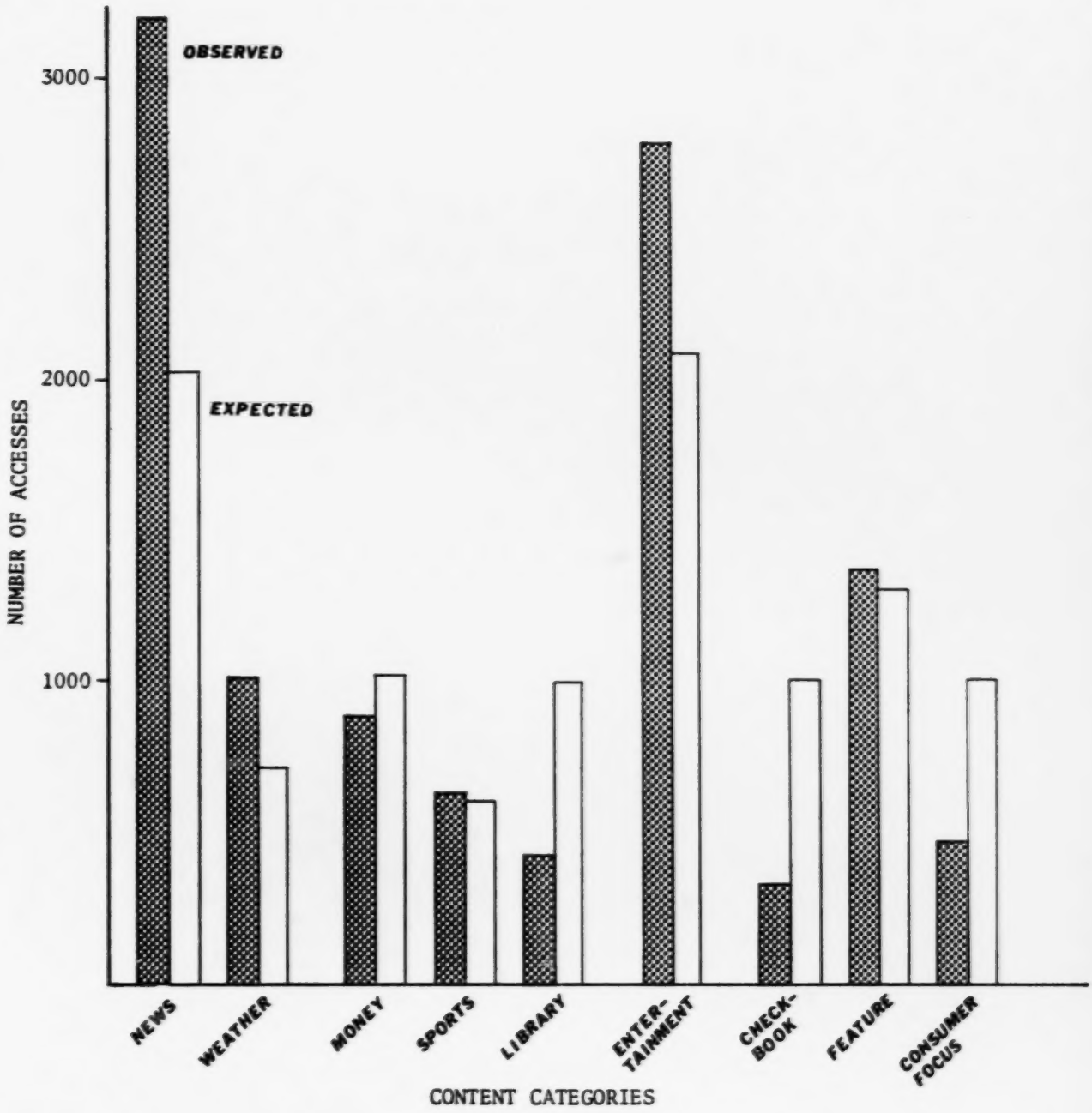


FIGURE 4: Residential Accesses Sept. - Dec. 1981

TABLE 4
Number of Accesses a Month to Each Category of Content, July-December, 1981*

CONTENT CATEGORY	MONTH						
	July FAD(rank)	August FAD(rank)	September FAD(rank)	October FAD(rank)	November FAD(rank)	December FAD(rank)	Overall Rank
NEWS	2.8 (3)	1.2 (2)	1.1 (2)	1.7 (1)	1.5 (1)	1.1 (1)	1
WEATHER	4.9 (1)	1.5 (1)	0.9 (3)	1.0 (2)	1.3 (2)	0.8 (4)	2
MONEY (Business)	1.3 (6)	0.6 (6)	0.4 (6)	0.4 (7)	1.0 (5)	0.8 (5)	6
SPORTS	2.4 (5)	0.8 (5)	0.4 (5)	0.5 (6)	1.2 (3)	0.6 (6)	5
LIBRARY	1.0 (7)	0.1 (8.5)	0.2 (8)	0.2 (9)	0.2 (8)	0.4 (7)	8
ENTERTAINMENT	2.6 (4)	1.1 (3)	1.3 (1)	0.9 (3)	0.9 (6)	0.7 (3)	3.5
WASHINGTON CHECKBOOK	0.8 (8.5)	0.4 (7)	0.2 (9)	0.2 (8)	0.2 (9)	0.2 (9)	9
FEATURE	3.7 (2)	0.9 (4)	0.7 (4)	0.8 (4)	1.1 (4)	0.9 (2)	3.5
CONSUMER FOCUS	0.8 (8.5)	0.1 (8.5)	0.2 (7)	0.6 (5)	0.3 (7)	0.3 (8)	7

*All index pages are excluded.

these two measures are strongly correlated; they need not have been.

The table shows that News and Weather were the most intensively used categories. Library, Consumer Focus, and Washington Checkbook were the least intensively used. For all categories except Consumer Focus, intensity of utilization was highest in July, in most cases by a substantial margin.

A brief discussion of the results for each category follows.

2.3.1 News. News was the most intensively used category from October through December, and the most intensively used category overall for the six month period. It was updated more frequently than the other categories (generally, twice on Mondays and once on other days). Also, it made the least use of graphics

The increase in utilization in October is probably related to an editorial change, as a result of which News carried stories which were exclusive to teletext. During July and August, news items had usually been summaries of stories in that morning's Washington Post. In late August, some longer stories were mixed in with the shorter ones. In late September, emphasis was shifted to having a larger number of shorter stories which did not duplicate what was in the paper.

2.3.2 Weather. Weather was the second most intensively used category overall. It was updated daily, occasionally twice a day. Pages were added at the start of each month to give the monthly forecast. They were carried for several days and then dropped until revised monthly forecasts were available around the middle of the month. The design and content of this category was fairly constant over the six month period, apart from minor changes in its index.

Graphics were important to the design of Weather pages, but they offered viewers no significant visual variety on a day-to-day basis.

2.3.3 Money. The content of this category was somewhat broader than its title suggests. It comprised (1) stories behind the financial news, provided by the Bureau of National Affairs; (2) information about financial markets; (3) jobs available, provided by the U.S. Department of Labor; and (4) from mid-August, tax tips from the Internal Revenue Service. The first of these was the most heavily used; if regarded as a category in its own right, it would have ranked third overall for the six month period. (As a whole, the category was sixth.) Not surprisingly, since very few of the residential sample were unemployed, the employment information was least heavily used.

Most of the content was updated on a daily basis.

2.3.4 Sports. Sports information was provided by the New York Daily News and was updated daily. In August content was changed from sports scores to sports stories, on the assumption that those who want sports scores would not be satisfied with daily updating.

The considerable increase in utilization in November is probably associated with the fact that the local football team, the Washington Redskins, were on a winning streak at that time.

2.3.5 Library. This was the only category with a title which related much more to the source of its information than the content. The category comprised material for children, community events and library information, all provided by the Martin Luther King Library. It was updated weekly.

Though the Library section was one of those which attracted relatively little use, it should be noted that, elsewhere, a public library system could well be the source of much of the information carried here in the Feature category.

2.3.6 Entertainment. The Entertainment category fluctuated in relative popularity, as indicated by its monthly rankings. Overall, it ranked third in a tie with Feature. It contained information about cultural events of interest in the greater Washington, D.C. area. Sections included Events, Horoscope and Mini Movie Reviews. The Movie Reviews were replaced later by "Cheap Flicks" and "Jazz Picks." Most of the content was changed on a daily basis.

2.3.7 Washington Checkbook. Washington Checkbook contained consumer information about local services. It was provided by a non-profit subscription service of the same name. Content was changed every two weeks. This may well have been responsible for the category's relatively low utilization.

2.3.8 Feature. In the Feature section, a different topic was treated on each day of the week. Topics included Congressional Insight (provided by the Congressional Quarterly), children's items (provided by the Martin Luther King Library and the Capital Children's Museum), brief book reviews, listings of local events, science items (provided by the Smithsonian Institution), and features dealing with new technologies.

Overall, Feature was equally the third most intensively accessed category (tied with Entertainment).

2.3.9 Consumer Focus. This category presented national consumer information which was provided by the General Services Administration. Many different agencies of the federal government originate such information; the GSA disseminates it on their behalf. The content, which was not very heavily accessed was changed once a week.

2.4 The Effect of Updating on Utilization

There is a strong relationship between the frequency with which the content of a category is updated (or just changed) and the utilization of that category. This is shown in Table 5. (The table is based on data from September through December, when usage was more settled than in July and August.)

There are two reasons for this relationship. First, with limited resources, the production team naturally chose to update more frequently the pages they expected to be more popular. Second, it is unlikely someone would choose to look at the same page several times over; a viewer who used teletext three times a week might have accessed any News page up to three times in a week, but would probably have accessed a Library page at most once. One would not expect the latter reason to apply at public locations with little repeat usage. In a later working paper we shall compare the effect of frequency of updating on residential and public location use.

2.5 Frequency and Heaviness of Use

The number of pages a household accesses in a month is determined by the number of times it uses teletext in the month and number of pages accessed at each session.*

Complete meter data were available for 27 households in which teletext was used in November. Figure 5 is a scatter diagram showing, for each of them, the number of sessions and average number of pages viewed per session during the month. (Note that it applies to the 27 households, and not to individuals within them.) It does not immediately suggest any marked correlation between the two variables.

To discuss the matter further, it is convenient to divide the sample into

*Throughout this section, we use 28-day months.

TABLE 5
Average Number of Daily Accesses per Page and Updating Frequency, September-December, 1981.

Category of Content	Average FAD Score	Frequency of Updating
News	1.4	8 times/week
Weather	1.0	Daily
Entertainment	1.0	Daily
Feature	0.9	Daily
Sports	0.7	Daily
Money	0.7	Daily
Consumer Focus	0.3	Weekly
Library	0.3	Weekly
Washington Checkbook	0.2	Biweekly

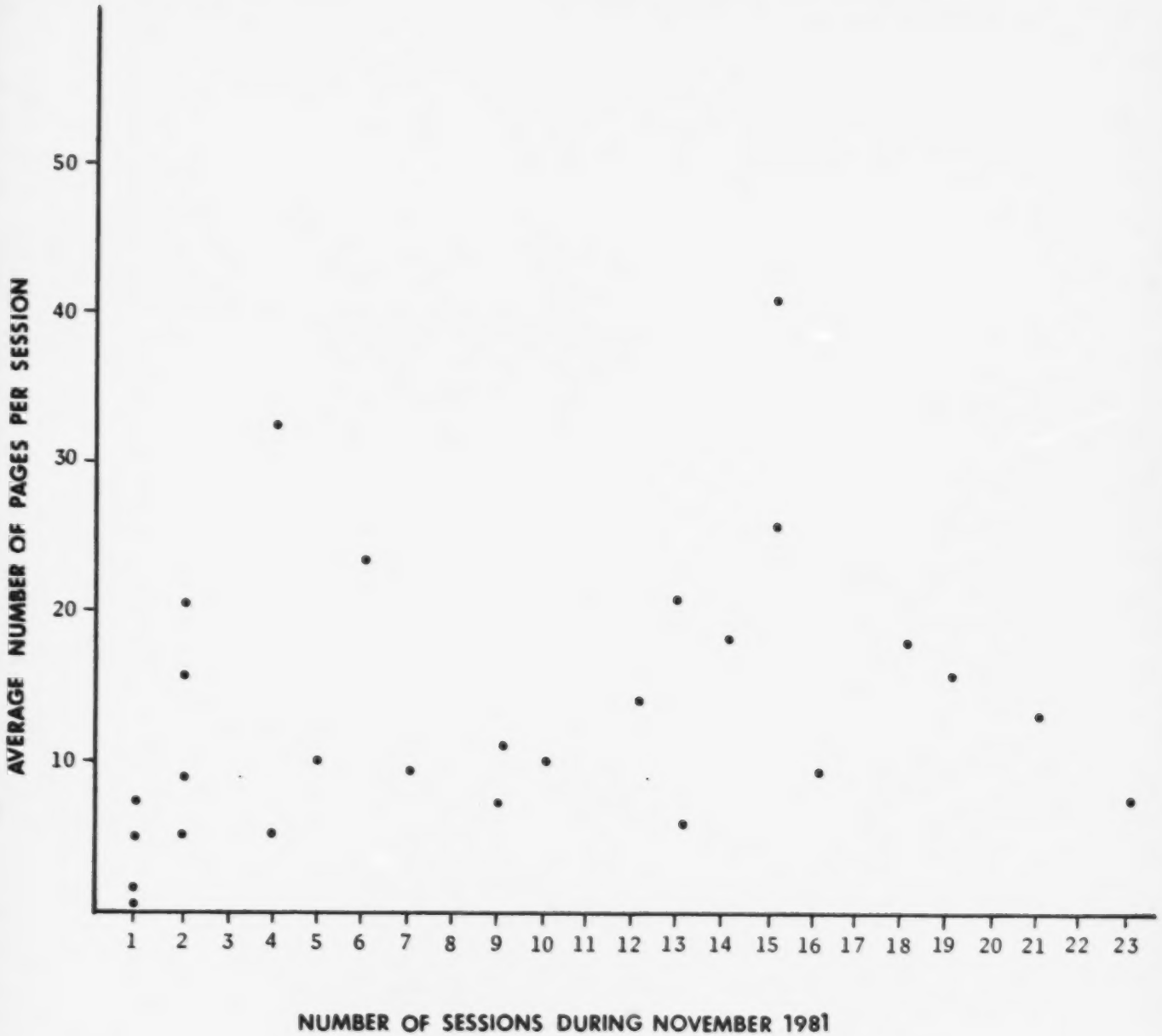

AVERAGE NUMBER OF PAGES PER SESSION
50
40
30
20
10
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
NUMBER OF SESSIONS DURING NOVEMBER 1981

FIGURE 5: Average Number of Pages Viewed Per Session Versus Total Sessions, Nov. 1981

three groups according to session frequency: low frequency, no more than once a week; moderate frequency, between 5 and 14 sessions a month (once a week to every other day); and high frequency, 15 or more sessions a month (more than every other day).

2.5.1 Low frequency users. There is little to be said about this group. Only three of the ten households viewed an average of ten or more pages per session.

2.5.2 Moderate frequency users. Seven of the ten households in this group viewed an average of ten or more pages per session. Within the group, there is a clear tendency for the average to rise as the number of sessions rises.

2.5.3 High frequency users. Five of the seven households within this group viewed an average of ten or more pages per session. Within this group, however, there is a clear tendency for the average to fall as the number of sessions increases.

In sum, the data suggest there was a group of infrequent users, most of whom accessed a relatively small number of pages a session. For the others, there was a tendency for the average number of pages accessed per session to rise with frequency up to use about every other day, then to fall. The household using the service most frequently did so on 23 out of the 28 days - i.e., about four days our of every five.

2.6 Relation Between Use of Teletext and Use of Television

During the survey in May, respondents were asked about the family's television viewing during the previous week. From 17 of them, data were obtained which could be used to estimate the number of hours television was in use during the week.

Figure 6 is a scatter diagram relating the average number of hours

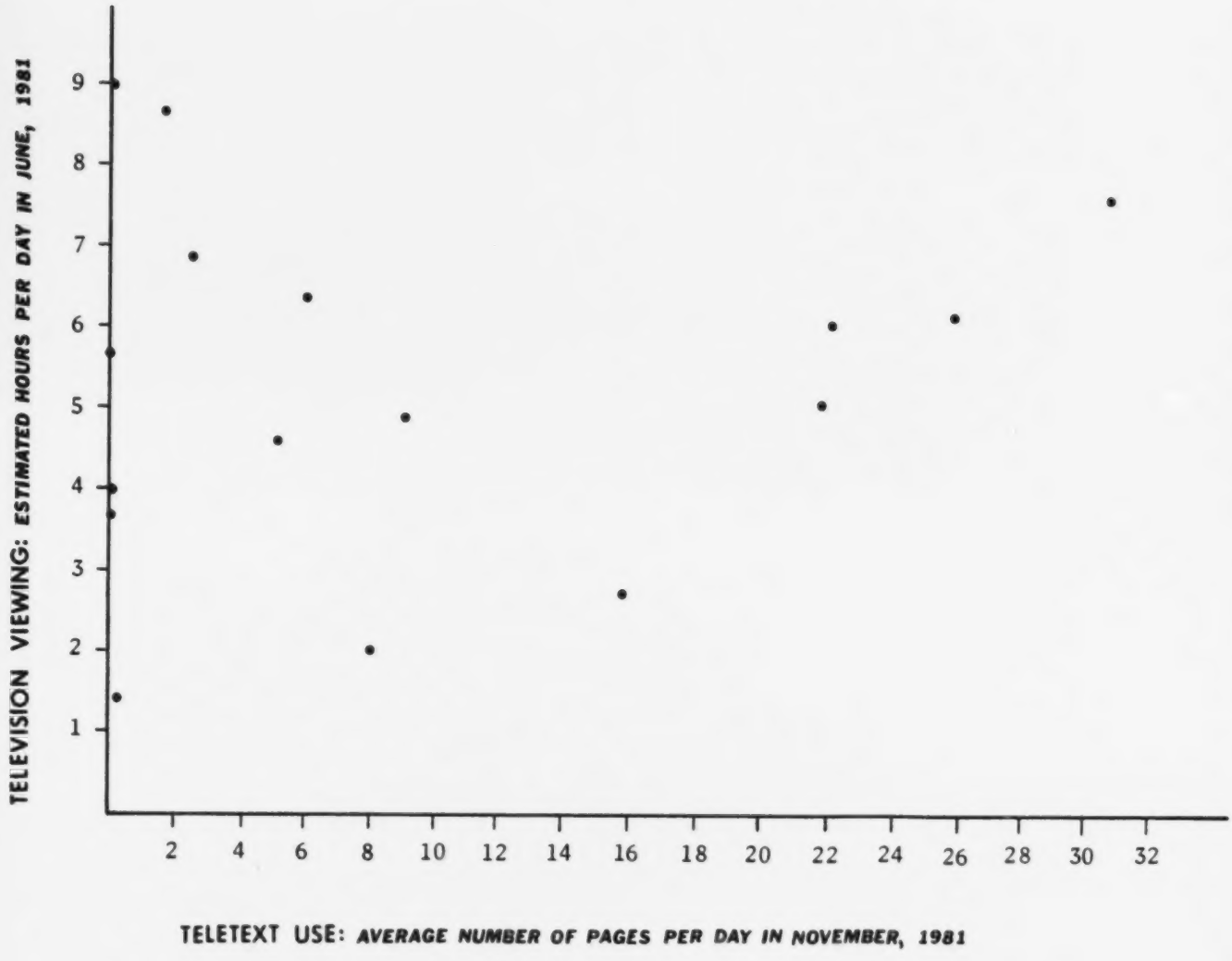


FIGURE 6: Television Viewing (Hours/day) Versus Teletext Utilization (Pages/Day)

of television use per day to the average number of pages of teletext accessed per day during November. It suggests that for some of the sample teletext use fell off as television use increased (i.e., for those accessing between 2 and 10 pages a day), while for others teletext use increased as television use increased (i.e., for those accessing 16 or more pages a day). The possible pattern must, however, be regarded as decidedly tentative: it is based on a very small number of households and a weak measure of television use.

2.7 The Primary User Within a Household

Table 6 indicates the frequency with which an adult male, an adult female, or a child was indicated as the heaviest user of teletext in the November survey. While adult males are most frequently the heaviest users, they do not overwhelm the others. (In Britain and in public places in our trial, teletext is overwhelmingly used by males.)

The table also shows how each of the groups was distributed in terms of level of use. It suggests that heavy use is most often associated with an adult male as heaviest user and light use is most often associated with a child as heaviest user.

TABLE 6
Primary Household User of Teletext by Frequency of Household Use, November, 1981

Primary User	Number	%	Number of Households at Each Level of Monthly Use			
			15+ Sessions	5-14 Sessions	1-4 Sessions	Zero Sessions
Adult Male	9	32%	4	2	3	0
Adult Female	7	25%	1	4	1	1
Children	8	28%	0	3	2	3
All Equally	4	15%	1	2	0	1
Total	28	100%	6	11	6	5

3. ATTITUDES

This chapter presents some of the findings based on the interview survey conducted in November, 1981. It addresses the following questions:

- What were respondents' attitudes towards design features - legibility, graphics, response time?
- What were their attitudes towards the different categories of content and how did they relate to use of the service?
- Was there a relationship between attitude towards the service (or use of it) and quality of reception?

Other findings are summarized in Appendix 3. Results of the diary study will be reported in a later working paper.

3.1 General Attitudes

Most of the viewers found the pages easy to read, the graphics attractive, but the system response time too slow. (These considerations influenced the service charges made in January) Detailed results are in Appendix 3.

3.1.1 Legibility. While almost everyone found the text easy to read, 12% of the respondents indicated some difficulty in reading the News pages. It should be noted that these pages generally carried more text than other pages; also, that they were composed off-site and may have been based on a different design philosophy.

3.1.2 Graphics. The graphics were popular. Viewers especially liked the Weather pages and, in particular, the national weather map. 75% of the respondents were satisfied with the proportion of graphics used. Only 8% felt that the graphics needed to be changed more frequently. However, Entertainment

was an exception: 21% of respondents desired more frequent changes in the graphics used here.

3.1.3 Response time. The main criticism of the service concerned page access time. This averaged a little over 10 seconds (less for chained pages), if there were no additional delays due to reception difficulties. (Access time is dependent on several different variables, as explained in Working Paper Number One.)

Several respondents indicated a preparedness to sacrifice some graphics in order to achieve a more rapid response.

3.2 Attitudes Towards Different Categories of Content

Responses to four of the questions (number 3,4,7, and 8) formed the basis of an overall measure of attitude towards a category of content. (For details, see Appendix 3.) Results are summarized in Table 7. It should be noted that the measure is ad hoc and subjective.

The table shows that Weather and Entertainment are viewed the most positively; Money, Sports, Library, and Washington Checkbook are viewed the most negatively.

3.3 Relationship Between Attitude and Use of Different Categories of Content

Figure 7 shows the relationship between average FAD score (i.e., average number of daily accesses per page), attitude, and frequency of updating. It suggests a very strong relationship: the relative utilization of any category could be modelled very accurately on the basis of (1) its number of active pages, (2) attitudes towards it, and (3) the frequency with which it was updated. The only outlier would probably be News; its intensity of utilization would be underestimated. The correlation between attitude and average FAD score is

TABLE 7
Distribution of Overall Attitude Scores by Content Category

CONTENT CATEGORY	Total Responses	Overall Attitude Positive	Mixed	Negative	Chi^2 Value
News	31	13	11	1	1.69
Weather	31	26	3	2	+12.95**
Money	29	16	12	11	- 9.45**
Sports	31	6	9	16	-28.36**
Library	31	9	8	14	-10.06**
Entertainment	30	23	3	4	+ 7.83**
Checkbook	31	17	3	11	5.47
Feature	29	14	4	11	- 3.64
Consumer Focus	28	15	7	6	0.20

Notes

1) For the method of allocating respondents to the three attitude categories, see Appendix 3

2) * - significant at 0.95 level
** - significant at 0.99 level

3) + before Chi^2 value implies a positive attitude while a - implies a negative one

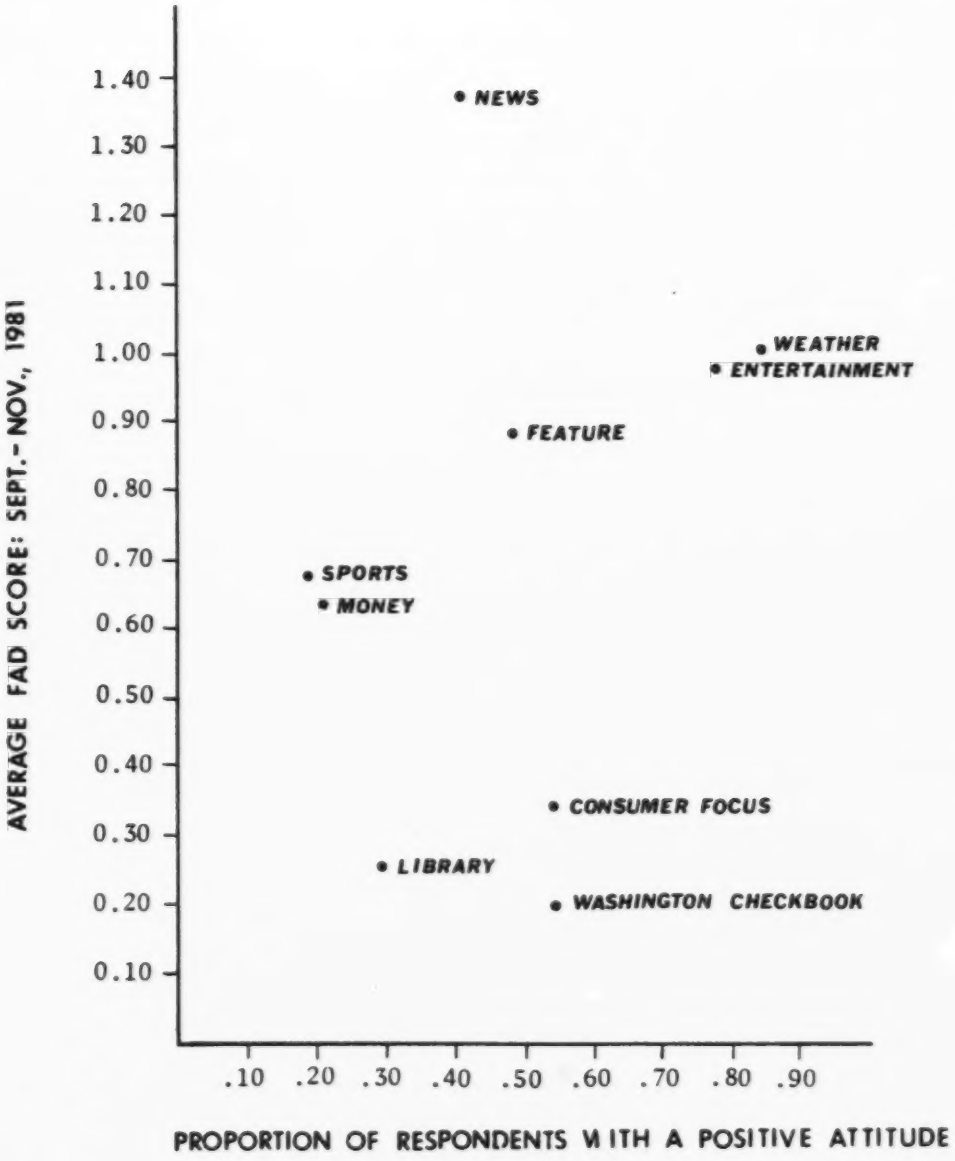


FIGURE 7: Average Daily Accesses Per Page Versus Attitude

statistically significant at the .99 level for the five categories which were updated daily.

3.4 Variation of Attitude and Use With Reception Quality

At our request, the engineer who visited homes regularly to tune sets, categorized households into those which had "Good" (25%), "Fair" (61%) or "Poor" (14%) reception. We explored the relationship of both frequency of use and overall attitude with quality of reception. Table 8 shows the results. There is no suggestion of a significant relationship in either case.

This is not surprising. The measure of reception quality is coarse, with three-fifths of the households in the intermediate category. Also, there was some variation of reception quality over time.

TABLE 8
Attitude and Use in Relation to Reception Quality

Reception	Overall Attitude				Frequency of Use				
Quality	Positive	Mixed	Negative	Total	High	Moderate	Low	Zero	Total
Good	2	0	3	5	1	2	2	0	5
Fair	9	5	8	22	5	5	5	7	22
Poor	5	2	2	9	2	3	1	3	9
Totals	16	7	13	36	8	10	8	10	36

4. SOME IMPLICATIONS

In section 1.6, we explained why great caution would be needed in generalizing from our results. It is even more dangerous to draw firm conclusions on the basis of much less than half the available data; this paper does not cover the second six months of residential use, nor the use of terminals at public places. Nevertheless, a limited discussion of the implications of the findings reported here may be useful in provoking questions, which will help guide our final analyses.

In offering some interpretation, we shall consider four subjects. The first is the design of a VBI teletext service. A number of fairly straightforward conclusions emerge here. Next we turn to issues of technical design. There is much that could be said with confidence on this subject, but, since this was not a technical trial, we give it little attention.

The third subject is methodological. Our treatment will not be comprehensive. On the other hand, we are able to draw confident conclusions on four topics: duration of a trial; problems in testing hypotheses relating to the information poor; desirable improvements in metering access; and computer processing of the meter records.

Finally, we turn to what may be expected in the utilization of other VBI teletext services in the U.S., limiting the treatment to relatively straightforward qualitative remarks.

4.1 Design of a Service

Even on the basis of the early analyses reported here, there are some implications for the design of a VBI teletext service.

4.1.1 Selection of content. In terms of use, News, Weather and Entertainment were relatively the most successful categories. (Note that the Entertainment pages provided information about entertainment opportunities in the area. Their primary purpose was not to be entertaining.) There are no surprises here.

By comparison with Britain, one might have expected Money and Sports to be more heavily used. However, their relative lack of success is probably explained by the fact that, in the trial service, they did not provide "hard information" on a timely basis.

Utilization is not the only relevant criterion for selecting content. In terms of viewers' attitudes, the most successful categories were Weather, Entertainment and Consumer Focus. The third of these provided consumer information, disseminated by GSA on behalf of other federal agencies. Such information is not easily available by other means.

4.1.2 Variation during the day. As would be expected, there was considerable variation in use over the day; about half the use took place during the evening. (Quite possibly, the average number of viewers per set was higher in the evening. Measured in terms of viewer-pages, evening use was probably rather higher than 50%.)

There are three implications to be drawn. First, residential use in non-evening hours is sufficiently substantial to warrant attention. Second, there is a case for varying the type of content during the day (taking into account probable differences in types of viewers and their viewing habits in the day as opposed to the evening). Third, updating should be matched to the pattern of utilization over the day. If some pages are changed once a day with information that becomes stale within hours, then the best time to update them would probably be shortly before the evening peak.

4.1.3 Access time. To judge from the reactions of those interviewed in the November survey, page access time was too long and, probably, would have been so even without the technical problems (noted in section 1.3.1) which made matters worse. This suggests a design decision to reduce the number of pages in the cycle and-or to economize on the number of bytes consumed in the transmission of complicated graphics. From January, there were substantially fewer pages in the cycle and a corresponding improvement in access time. The effect of this change will be explored in a forthcoming working paper.

4.1.4 Number of pages in cycle. As noted in the preceding paragraph, there was a case for reducing the number of pages in the cycle. Since the Sports, Money, Library, and Washington Checkbook categories accounted for about 35% of the pages, but only about 20% of the accesses, there was probably the scope to do this without serious damage to the service. This is not to imply that the total elimination of those categories would have been appropriate if this had not been a trial; the BNA portion of the Money category, for example, was particularly heavily accessed. From an operational standpoint, the best approach might well have been to eliminate weaker categories, or sections within them, during the morning peak and the evening, and to have allowed more pages, with slower access times, during the working day.

4.1.5 Graphics. It was clear from the survey that the high quality graphics were appreciated by respondents. It seems likely that they contributed to relatively high level of use during the first two months. On the other hand, they had a damaging impact on access time (which was a source of irritation to viewers) and they are expensive in terms of production effort.

There was a case to be made for reducing the use of graphics. To

have changed graphics less frequently would have saved production time. To have had fewer pages with graphics and-or to have reduced the average complexity of graphics would have saved production time and reduced access delays as well. This is not to say an alphamosaic system would have been as good. We expect to cast some light on the relative values of alphageometric and alphamosaic graphics, when we have fully analyzed the results of some recent psychological studies. We cannot, however, expect them to provide definitive answers to the complex questions which arise in this connection.

4.1.6 Chaining. Use fell off quite rapidly for each subsequent page in a chain. (The specific results are not presented in this paper.) This suggests that chains should probably be limited to three or four pages, unless the capability is used in a way which is different from the way we used it.

4.2 Technical Design

As is to be expected with early models of a new technology, we came across numerous minor technical problems and opportunities for improvement. Some were noted in section 1.3 above and in a paper by Gary Schober.* Others related to equipment and software at the production and transmission sites. Many of these were attended to during the trial; others are reflected in improvements in equipment which is being made now.

Since ours was not a technical trial, we shall take up only two technical concerns here. We shall consider the metering equipment when we come to methodological issues.

* "The Teletext Field Trial in Washington, D.C.: Technical Background and Issues," Alternate Media Center, NYC. (Spring, 1981).

4.2.1 Human factors. As noted in the Introduction, the design of the keypad was decidedly awkward. Note also the desirability of incorporating a remote control unit (for switching channels) into the keypad.

4.2.2 Reception. It is difficult to generalize about reception on the basis of our experience. It is quite possible that, on a VHF channel, operated with very high engineering standards, in a topographically benign environment, reception would not be a problem. Nevertheless, we strongly believe that the significance of reception difficulties for broadcast teletext in the United States has been underestimated.

For present purposes, it is more important to note the second order problems which can be caused. In the context of a field trial with a fixed budget, their combined effect can be devastating. In our case, such problems included: longer access delays; diversion of management time from service issues; diversion of staff time from collection of meter tapes; user frustration; lost data; a major source of random variation to weaken statistical analyses; and inability to implement the experimental design as planned.

4.3 Methodological Implications

While many methodological issues must await further analysis, some are clear already.

4.3.1 Duration of trial. It took ten to twelve weeks for residential use of the teletext service to stabilize. There seems little point in conducting a user trial in which viewers have terminals for less than five or six months.

4.3.2 Testable hypotheses. We experienced more problems than anticipated in locating terminals in poorer districts. Intended recipients were concerned

that the fancy looking equipment would encourage burglary. A focus on the value of residential teletext to those who are least economically advantaged will raise more practical problems and incur more costs than a focus on other types of users. This does not necessarily apply to the use of terminals at public locations.

Moreover, a strong connection can be expected between being "information poor" and being unable to afford teletext. On the other side of this coin, our residential service seemed to find most favor among those who already owned sophisticated electronic equipment - e.g., videotape recorders, personal computers, and video games, all signs of disposable income.

4.3.3 Meters. On the basis of what we have learned, three improvements in the design of the meters deserve serious consideration. The first is simple: they need to be more robust, less prone to accidental disconnection or turning off. We considered the second when planning the pilot: having the meters record viewing of regular television channels. We rejected the idea then because we needed to keep the meters as simple as possible to minimize their expense. Also, we wished to limit as much as possible the information we would request from members of the sample, so as to minimize any fear of intrusion of privacy.

The third change we would consider would be whether meters could record data which would indicate the quality of reception. Although we found indications in the meter data of variation of reception over time for the sample as a whole, we had no measure which could be applied at the level of the individual set. Unless reception were much better than during our pilot, the ability to control for variation in reception quality would be highly desirable.

4.3.4 Data base. In a larger scale field trial, data entry for the meter records and data base architecture would be most important considerations. During the pilot, the audio tapes containing the meter data were played, in real time, through a personal computer into a mainframe computer. The approach was flexible and convenient, but would not have worked well on a much larger scale.

The data were analyzed on a batch basis. If we had had the resources, we would have developed a suite of programs before the pilot started, for routine processing of the data on a frequent regular basis. In a larger trial it would be more efficient to feed the data into a flexible management information system which would allow a high level of interaction between analyst and data.

4.4 Suggestive Results

Some of our results concerning use of the service appear very similar to those obtained in Britain; others are somewhat different. We do not wish to go too far before completing our analysis of the data. However, the following tentative conclusions can be drawn now.

4.4.1 Utilization over time. We would expect a substantial novelty effect to inflate use in the first two to three months of a new teletext service.

4.4.2 Use through the day. We would expect the pattern of use we found during the day to apply elsewhere: a short morning peak and a longer evening peak, with about half the use before and half after 5 p.m. (As we have noted above, use measured in viewer-hours or viewer-pages is likely to be more than 50% in the evenings.)

4.4.3 Frequency and heaviness of use. As compared with the UK, we found that our viewers used teletext less frequently, but that more pages were accessed on aver-

age per session. We would expect this elsewhere, if a teletext service is available on only one channel, has rather long access times, and has no "Newsflash" feature.

4.4.4 Importance of frequency of updating. It appears that frequency of updating is an important determinant of use. One-third of our categories were updated on a weekly basis or less frequently. This is almost certainly too low a level of updating.

4.4.5 Skewed distribution of accesses. We would expect the distribution of accesses over pages to be heavily skewed elsewhere too.

4.4.6 Bias towards males. Our results show a bias towards males, though this is less than in the UK.

4.4.7 Association with other high technology products. As in the UK, we noticed that teletext was of more interest to those who already owned high technology electronic entertainment products such as video games, video-tape recorders, and personal computers.

4.5 Change in the Service in January

The service was considerably changed in January, 1982. Some categories were reorganized and some (including News) were dropped. The number of pages in the cycle was reduced by about 40%, with a corresponding improvement in access times. Major changes were made in the style of graphics. It will be interesting to see what effect these changes had.

APPENDIX 1

Teletext Publications of the Alternate Media Center

Working Papers from the Research Program:

No. 1 Elton, "Access Time and Reception Quality in the Field Trial in Washington, D.C." (September, 1981)

No. 2 Champness & Alberdi, "Measuring Subjective Reactions to Teletext Page Design." (September, 1981)

No. 3 Nisenholtz, "Early Use of Graphics in the Alternate Media Center/WETA Teletext Trial." (December, 1981)

No. 4-5 Nisenholtz, "Early Experiences of Information Providers in the Teletext Field Trial in Washington, D.C." and Elton, "Labor Costs of Creating Teletext Pages." (February, 1982)

Other relevant publications:

Burns, "Technology is Not Enough."

Schober, "The Teletext Field Trial in Washington, D.C.: Technical Background and Issues." (Spring, 1981)

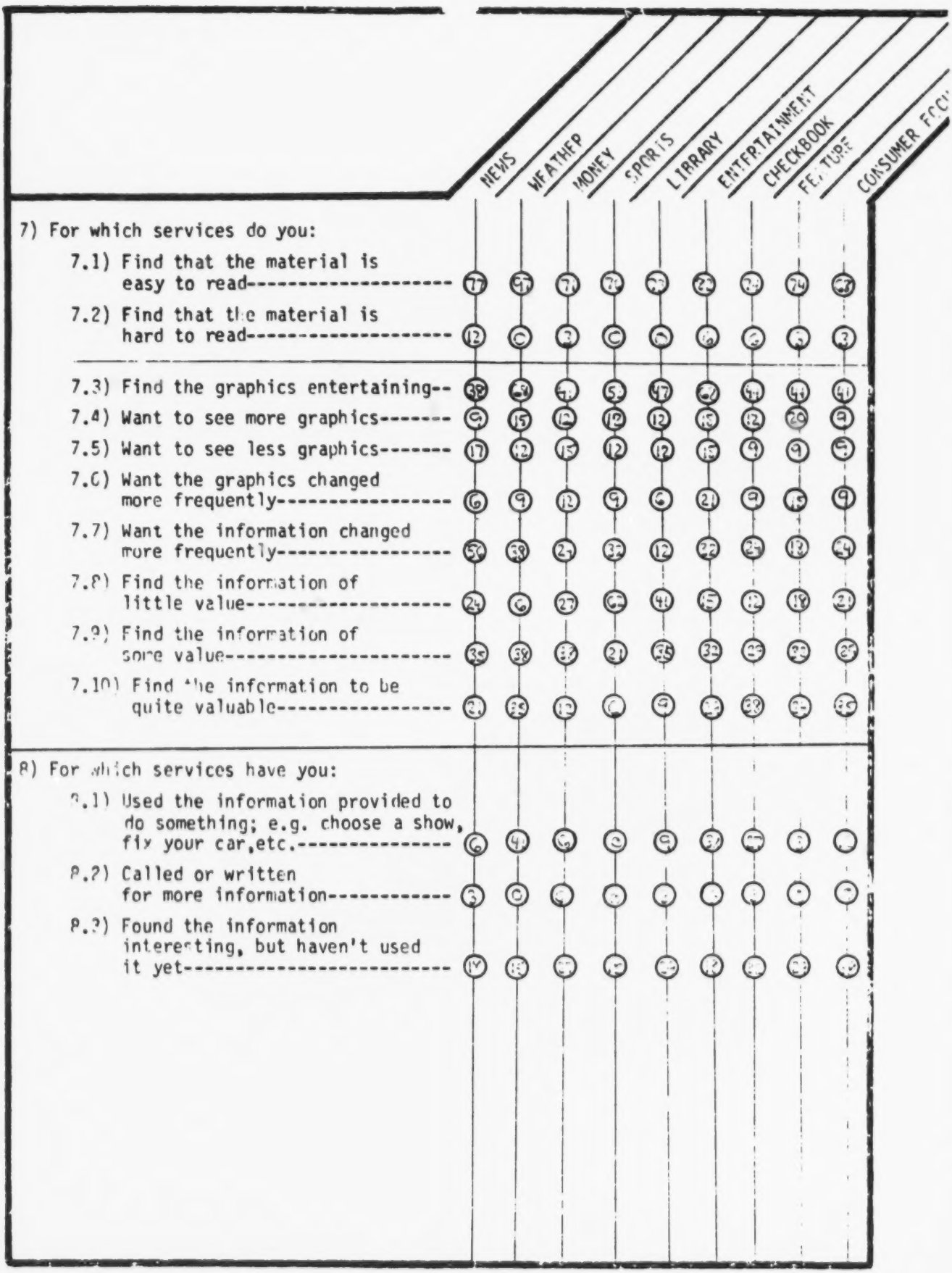
APPENDIX 2

November Questionnaire and Statistical Summary

Note

The distribution of responses is shown for all questions, except questions 10, 12 and 13. Except for question 9, all the numbers are percentages. For each of questions 1-8, the column totals are less than 100% by the percentage of null responses to that question for that category.

	NEWS	WEATHER	MONEY	SPORTS	LIBRARY	ENTERTAINMENT	CHECKBOOK	FEATURE	CONSUMER FOCUS
1) For which services would you prefer:									
1.1) Many short 'blurbs' on a variety of topics	50	57	32	50	35	65	32	24	21
1.2) An 'In-depth' treatment of a few topics	35	8	44	12	15	27	41	35	44
2) For your needs, which services provide:									
2.1) Sufficent information	44	85	24	29	44	44	44	38	35
2.2) Too little information	41	3	32	29	9	41	18	18	24
2.3) More information than necessary	9	6	3	9	9	6	3	6	3
3) For which services do you find the information provided:									
3.1) Timely and useful	32	74	21	15	32	62	44	35	56
3.2) Timely but not useful	24	3	12	12	21	6	3	6	0
3.3) Useful but not timely	18	15	9	24	0	9	3	3	9
3.4) Neither timely nor useful	24	6	24	27	21	6	6	21	3
4) If you had the choice, which services would you:									
4.1) Most prefer to continue to receive	29	82	38	38	21	79	56	44	47
4.2) Least prefer to continue to receive	19	6	32	44	56	12	29	32	21
5) Pelative to other information sources avaliable to you, for which services do you find that:									
5.1) It is easier to use Teletext	18	44	18	21	32	56	32	29	32
5.2) It is more effort to use Teletext	68	38	41	44	29	24	29	29	27
5.3) It is about the same effort to use Teletext	12	12	15	15	15	15	21	18	15
6) Check those services for which you find that the information provided:									
6.1) Complements or adds to that available from other sources	44	47	47	35	21	44	27	15	32
6.2) Is generally not available elsewhere	0	3	9	0	29	12	12	35	12
6.3) Peplaces information available elsewhere	29	29	12	24	15	29	32	21	27


NEWS
WEATHER
MONEY
SPORTS
LIBRARY
ENTERTAINMENT
CHECKBOOK
FEATURE
CONSUMER FOCUS
7) For which services do you:
7.1) Find that the material is easy to read
7.2) Find that the material is hard to read
7.3) Find the graphics entertaining
7.4) Want to see more graphics
7.5) Want to see less graphics
7.6) Want the graphics changed more frequently
7.7) Want the information changed more frequently
7.8) Find the information of little value
7.9) Find the information of some value
7.10) Find the information to be quite valuable
8) For which services have you:
8.1) Used the information provided to do something; e.g. choose a show, fix your car,etc.
8.2) Called or written for more information
8.3) Found the information interesting, but haven't used it yet

9) Who in your home:

9.1) Uses Teletext the most-------

name		relationship
Adult Male	9	32 %
Adult Female	7	25 %
Child	8	28 %
All Equally	4	15 %
	28	100 %

9.2) Uses Teletext the least------

10) Are there specific times when you and your family tend to watch Teletext---------- ○ Yes ○ No

If yes, when----------

time	weekdays	weekends

11) Do you get frustrated waiting to receive Teletext pages---------- (71) Yes (29) No

Other _____

12) What are your favorite pages-------

name	page #

13) Additional comments----------

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APPENDIX 3

Derivation of the Measure of Overall Attitude

We wished to determine for each respondent whether he or she had a positive, mixed or negative attitude overall towards each category of content. This appendix describes the method we used.

The method was based on answers to questions 3,4,7.8-7.10, and 8 in the questionnaire (Appendix Two). Question 3 referred to timeliness and usefulness of each category. Question 4 concerned the most and least preferred categories. Question 7 (parts 8,9, and 10) asked about perceived value and question 8 was concerned with whether the information had triggered action. (It could be argued that the use of question 8 biased the overall score in favor of those categories, such as Washington Checkbook and Entertainment, and against those such as News and Sports. The former were designed to trigger action.)

Scores were allocated in accordance with the following table. The most frequent response always determined assignment to the appropriate attitude category (positive, mixed, neutral). Ties were resolved using the following rules:

(i) a + response canceled a - response resulting in an assignment to the mixed category.

(ii) a + single or a - single response dominated a single + or - response resulting in an assignment to either the positive or the negative category.

Question Number	Response to the Question	Score for any Category Receiving the Response
3	3.1	+
	3.2	+/-
	3.3	+/-
	3.4	-
4	4.1	+
	4.2	-
7	7.8	-
	7.9	+/-
	7.10	+
8	8.1	+
	8.2	+
	8.3	+/-

THE LAST FIVE MONTHS OF A PILOT TELETEXT SERVICE:

INTERIM RESULTS ON UTILIZATION AND ATTITUDES

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The trial has been conducted in collaboration with WETA-TV. The equipment was purchased from the Canadian Department of Communications, which has generously provided all manner of additional assistance.

This support is acknowledged with gratitude. However, the findings and judgements presented in this paper are solely the responsibility of its authors.

SUMMARY

Working Paper Number Six covered residential use of the trial service in Washington, DC and viewers' attitudes towards it during the second half of 1981. The present paper presents interim findings on these subjects for the first half of 1982. It should be read in conjunction with the previous paper.

The form of the teletext service was substantially changed at the beginning of 1982. The average number of pages was reduced from about 110 to about 70. There was a corresponding reduction in the duration of the cycle, from more than 20 seconds down to about 13 seconds. While the earlier service could be characterized as a small electronic newspaper, the service to which this paper relates is best characterized as a small electronic feature magazine.

There was little change in the level of use of teletext after the change in the service. The pattern of use during the day was much the same too. Because of changes in content and the way it was organized, it is impossible to make direct comparisons of the popularity of different sections between the two services. Once again, however, the level of use of any category of content was strongly related to the three variables: number of pages in the category, its frequency of updating, and a measure of viewers' attitudes towards it. Some evidence was found of a slight shift in appeal away from adult males and to younger viewers.

Again, the graphics were popular. Despite the sizeable reduction in the duration of the cycle, access delay still appeared to be the major drawback of the service for viewers.

Two topics are covered here which were not covered in the previous paper: use of index pages and willingness to pay for teletext. It was found that about 40% of accesses were to index pages. More than a third of those interviewed indicated that, when buying a new color television set, they would be prepared to pay an additional $100 to $200 for one which could receive teletext. As regards willingness to pay for teletext, the ability to access services on several channels was of some importance.

In the final chapter, some implications are drawn from the findings presented here. A more thorough and comprehensive analysis, drawing on all the working papers in the series, will be provided in the final report which will be published around the end of the year.

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1.0 INTRODUCTION

1.1 Purpose and Content of the Paper

This paper is the second to report on residential viewers' use of the teletext service broadcast in collaboration with WETA-TV in Washington, D.C. and their attitudes toward the service. It covers the period from January 1, 1982, when the revised service commenced operation, until June 1, 1982, when sets began to be removed from the homes of viewers in preparation for the end of the trial. (Teletext service continues under the management of WETA.)

The purpose of the trial, the nature of the equipment used and the subject population have been discussed in previous reports (see, in particular, Working Paper Number Six) and will not be discussed in detail here. The remainder of this section describes the content of the service, the measuring instruments used and the limits to the generality of the findings.

1.2 Content of the Service

From January through June, 1982, there were eight categories of content; each headed by an index page. These sub-indexes were listed in a master index which was automatically displayed when a viewer turned to teletext. The categories are listed and described briefly in Table 1.

The service which started in January was very different from the service which preceded it. In order to provide faster page access time the total number of pages was reduced to approximately 70. The previous service had contained an average of 110 pages. The average

TABLE 1

The Teletext Service, January - May, 1982

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
10-19	PERFORMANCE				
	Events Around Town	AMC	AMC/Washington	7	Once/day
	Theatre Movie Dance Goodie (reminders of events mentioned previously)				
	Discount Tickets	Ticket Place			
	Movie Review				Weekly
20-29	ON VIEW				
	Museums (Exhibits) Sight (Architecture) Nature (Walk or scenic view)	AMC	AMC/Washington	7	Weekly
30-39	MIND PLAY				
	Game (Visual problem) Logic Puzzle	Mammoth Book of Games	AMC/Washington	11	Once/day
	Bridge	Tom Troop			
	Chess	Xerox Learning Systems			
	Alphabet (History of a letter)	American Heritage Dictionary			

TABLE 1

The Teletext Service, January- May, 1982 (con't)

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
40-49	FOR KIDS				
	Story or Activity	Children's Museum	AMC/Washington	11	Weekly
	Events	AMC			
	Story or Activity	Martin Luther King Library			
50-59	ANALYSIS				
	Labor, Business and Economic News	Bureau of National Affairs	BNA and AMC/ Washington	7	Once/day
	Economic Statistics (Charted)				
	Congressional Insight	Don Smith	AMC/Washington		
60-69	BULLETIN BOARD				
	Community Information	MLK Library	AMC/Washington	10	Weekly
	IRS Tax Tips	IRS			
	Consumer Information	General Services Ad.			
	Auto Safety	AAA			
	Job Listings	U.S. Dept. of Labor			Once/day

TABLE 1

The Teletext Service, January- May, 1982 (con't)

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
70	ELECTRO-ART				
	Graphic Design	AMC	AMC/Washington	1	Weekly
80-89	WEATHER				
	Local	National Weather Service	AMC/Washington	4	Twice/day
	Regional				
	3-Day Forecast				
	National				
	Ski Conditions	AMC			
	INDEX PAGES			9	
	TOTAL PAGES			67	

cycle duration for the new service was between 13 and 14 seconds, down from 20 to 27 seconds. As mentioned in Working Paper Number Six, limited staff resources constrained the frequency with which the content could be updated.

1.3 Measuring Instruments

Meters continued to be used for recording the date, time and page number for each access. Data were at the level of the household and cannot be classified at a finer level. (For details of the metering, see sections 1, 2, and 1.5 of Working Paper Number Six.)

A final interview /survey and diary exercise were conducted in April, 1982. Users were given a questionnaire and asked to record their reactions to teletext and their willingness to pay for a variety of teletext services (see Appendix 2). They were also asked to complete a diary recording their use of teletext for seven consecutive days (see Appendix 3).

The April, 1982 diary differed slightly from the one used in November, 1981. The differences between the diaries allow methodological comparisons which will be discussed in a forthcoming working paper.

1.4 Limits to the Generality of the Findings

It is important for the reader to exercise caution in extrapolating from our results. Our findings may not be applicable to other situations for the following reasons:

1. The sample was small and users received the service free.
2. The sample was non-representative and was skewed towards WETA members.

3. Many different approaches can be taken to the design of a teletext service. Most other services are likely to be different from ours.

4. Recurrent reception difficulties caused loss of service for some viewers and in other cases increased average access time.

5. Teletext was available on one channel. In the future, it seems reasonable to assume that these services will be available on several channels.

Subject to these qualifications, useful conclusions can be based on the findings. This paper, however, will report results rather than draw detailed conclusions. Overall conclusions will be presented in a final report which will compare the two systems and draw on material from a separate study of public place use of the teletext service.

2.0 USE OF TELETEXT

In this section we discuss the following aspects of the use of teletext for the period from January to May, 1982.

- Utilization of teletext over time
- Utilization of teletext by time of day
- Utilization of different categories of content
- Effect of updating on utilization
- Frequency and heaviness of use
- Relation between use of teletext and use of television
- Utilization of teletext by primary user within a household

All of these issues were covered in the previous working paper. Where appropriate we make comparisons between the old and the new service.

2.1 Utilization Over Time

Figure 1 represents the number of accesses to teletext for each week from July, 1981 through May, 1982. Week 28 is omitted, since it covers the Christmas period, when a special service was broadcast.

There are three points to be made. First, despite the changes in the content of the service and its cycle length starting in week 29, the overall level of use remained roughly the same as before (typically, 600-900 access/week). This may be an indication that our sample households had developed fixed habits of use which were not affected by the change in system content.

Second, note the peak in use during week 44. This coincided with the final series of interviews conducted at each household. Apparently, the presence of an interviewer caused teletext use to increase for a brief period.

Finally, overall use fell during May. It is possible that users were aware that the trial was coming to an end.

2.2 Utilization Through the Day

The percent of total use by hour of the day is presented in Figure 2. Note that the highest daytime use (6%) is between 8 and 9 a.m. after which use falls off until 11 a.m., increasing again between 11 and 1 p.m.

The pattern of use during the day is much the same as during the first six months of the trial.

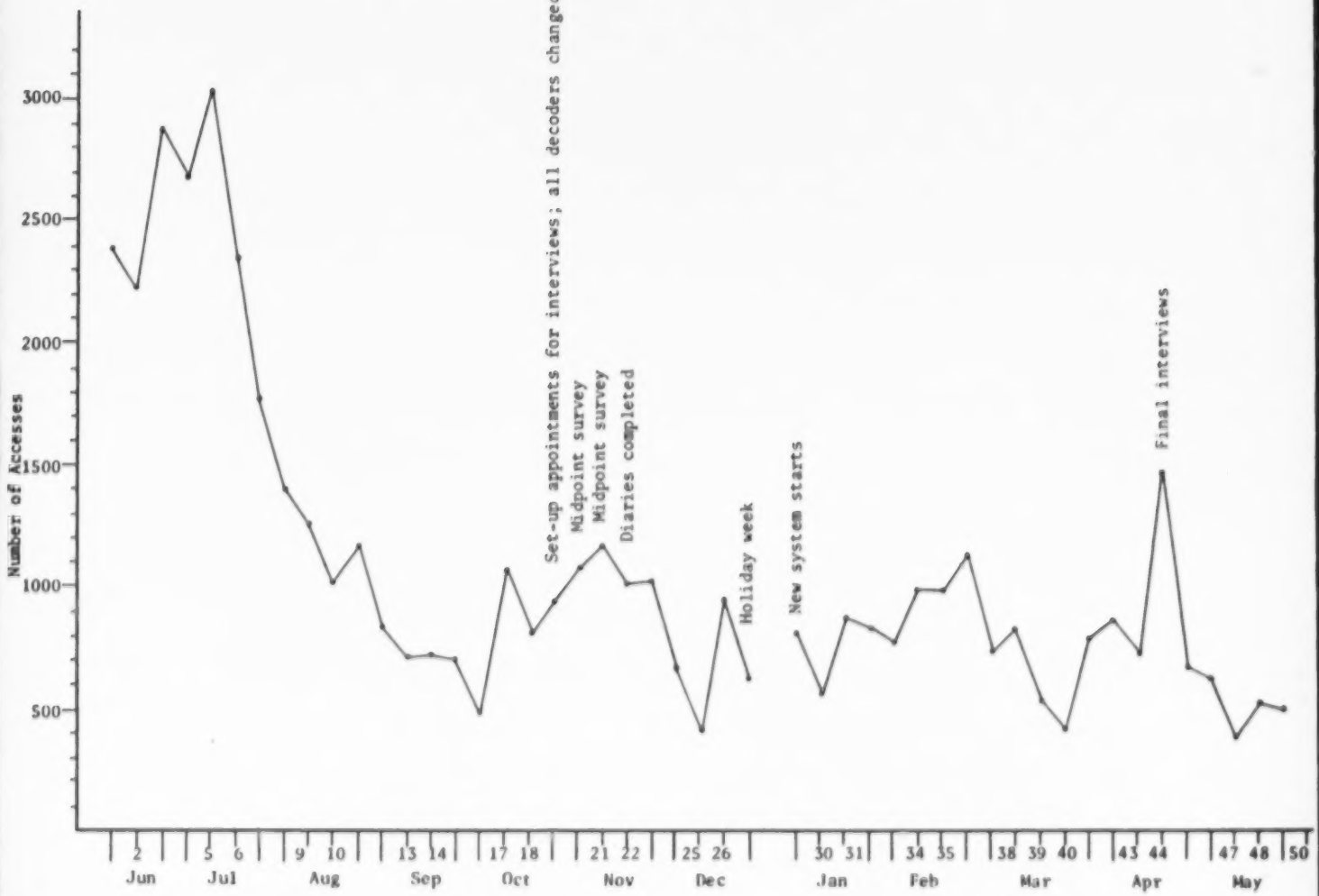
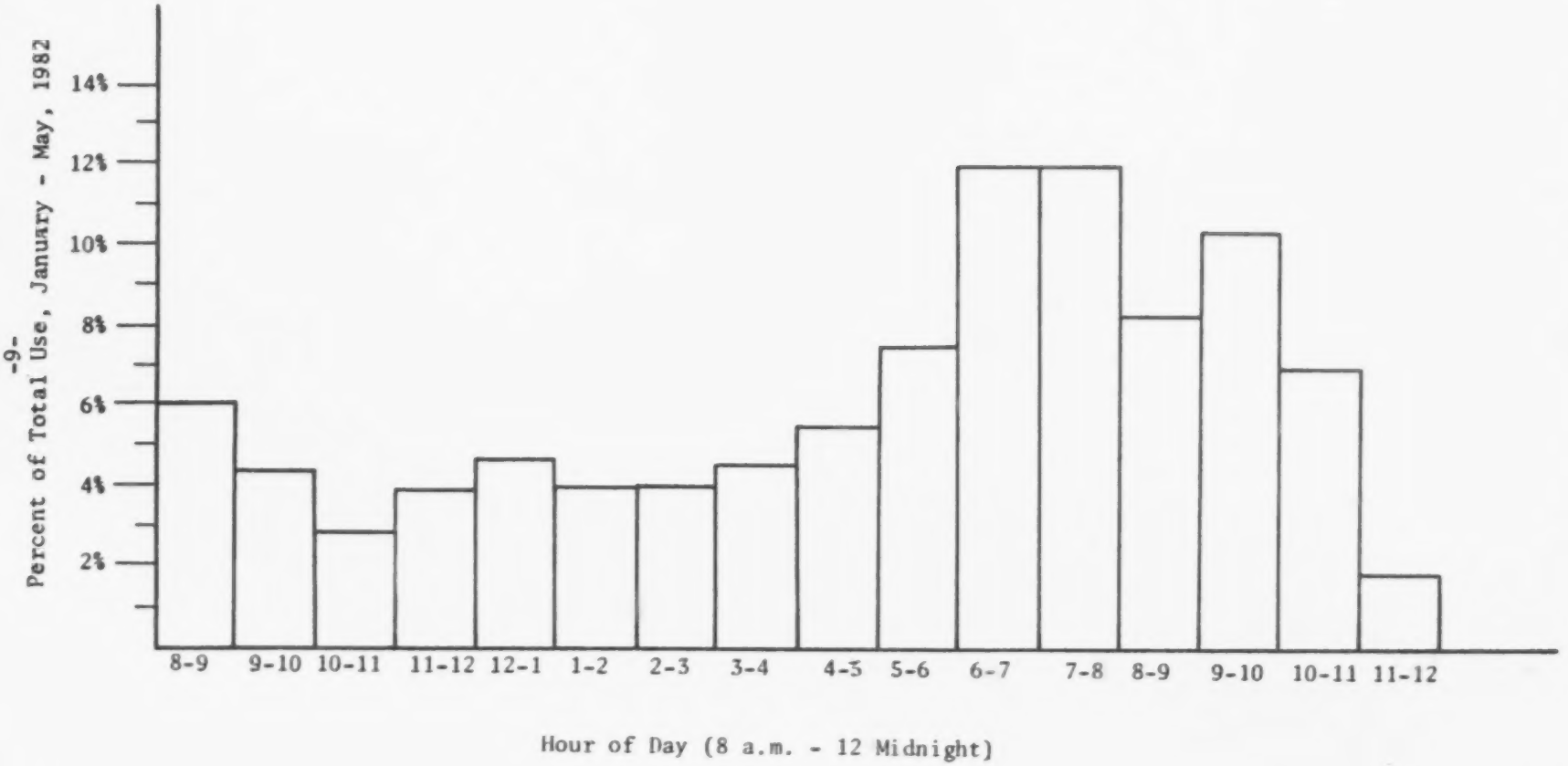

Number of Accesses
3000
2500
2000
1500
1000
500
Set-up appointments for interviews; all decoders changed
Midpoint survey
Midpoint survey
Diaries completed
Holiday week
New system starts
Final interviews
2 5 6 9 10 13 14 17 18 21 22 25 26 30 31 34 35 38 39 40 43 44 47 48 50
Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May

FIGURE 1: Number of Accesses to Teletext, Week by Week, June, 1981 - May, 1982



82

FIGURE 2: Percent of Overall Use of Teletext, January - May, 1982, by Hour of Day

2.3 Utilization of Different Categories of Content

Table 2 presents use of each content category for each month from January to May, 1982 (based on average FAD scores).* The monthly use of each category is expressed in terms of its rank relative to other categories (the numbers in parentheses after each average FAD score). The overall rank for each category over all five months appears in the far right column of Table 2.

Note that Electro-Art, Weather and Analysis were the most used categories. Electro-Art was a one-page category which partly explains its high use. Weather and Analysis followed Electro-Art in popularity; they were used roughly the same amount. Performance and Mind Play were the next most popular categories followed by On View and Bulletin Board. For Kids was the least used category.

2.4 Most Frequently Accessed Pages

We have disaggregated the meter data for different categories of content and examined the popularity of individual pages -- i.e., the relative number of accesses to each. This was possible because page numbers were used consistently: page number 82 was always the three-day forecast, page 70 was always Electro-Art, and so on.

Results are shown in Table 3. For each page the score is given by the formula $\frac{nA}{aN}$, where "n" is the number of accesses and "a" the number of days the page in question was available; "N" and "A" are defined similarly for the most frequently accessed page. Scores, therefore, are

*Since each page existed for a varying number of days per month, the FAD scores (Frequency per Active Day) provide a normalized basis for comparing the use between pages.

TABLE 2

Number of Accesses a Month to Each Category of Content, January - May, 1982

Content Category	January FAD(Rank)	February FAD(Rank)	March FAD(Rank)	April FAD(Rank)	May FAD(Rank)	Overall Rank
	Month					
Performance	1.3 (3)	1.7 (4.5)	1.1 (4.5)	1.4 (5)	0.9 (4)	(4.5)
On View	0.9 (6)	1.0 (7)	0.7 (6.5)	1.0 (6.5)	0.6 (6.5)	(6.5)
Mind Play	1.2 (4)	1.7 (4.5)	1.1 (4.5)	1.7 (4)	0.7 (5)	(4.5)
For Kids	0.8 (7)	0.8 (8)	0.4 (8)	0.6 (8)	0.5 (8)	(8)
Analysis	1.0 (5)	2.0 (2)	1.3 (3)	1.8 (3)	1.4 (3)	(3)
Bulletin Board	0.7 (8)	1.2 (6)	0.7 (6.5)	1.0 (6.5)	0.6 (6.5)	(6.5)
Electro-Art	5.6 (1)	4.0 (1)	4.1 (1)	5.4 (1)	3.4 (1)	(1)
Weather	2.1 (2)	1.9 (3)	2.4 (2)	3.0 (2)	1.5 (2)	(2)

TABLE 3

Most Frequently Accessed Pages, January-May, 1982

Content	Ranking
1. Electro-Art (Graphic design)	10.00
2. Games (e.g., word game or chess)	5.71
3. Local Weather	5.02
4. 3-Day Forecast	5.02
5. Congressional Insight	4.55
6. Logic Puzzle	4.09
7. National Weather Map	3.81
8. Business/Economic Analysis	3.80
9. Ski Report	3.40
10. Community Events Listings	3.26
11. Charts of Business Trends	2.87
12. Alphabet (History of a letter)	2.85
13. Washington Entertainment Listings	2.82
14. Washington Entertainment Listings	2.64
15. Washington Entertainment Listings	2.59
16. Washington Entertainment Listings	2.56
17. Sight (Architecture)	2.45
18. Job Listings	2.44
19. Bridge	2.42
20. Museum Exhibitions	2.15

directly proportional to the daily rate at which pages were accessed.

In deriving Table 3, pages chained to another page were omitted, as were index pages. (Electro-Art was anomalous in that it was both a sub-index page and a content page in its own right.)

Discussion of Table 3 will be held over until it can be compared with the similar table for public places.

2.5 Use of Indexes

Table 4 presents the relative use of index and content pages for the 1982 service. (Electro-Art, a one-page category, has been considered as a sub-index page.) Note that index pages account for 41% of all page accesses.

TABLE 4 - Relative Use of Index and Content Pages

Master Index	18%
Sub-index	23%
Content Frames	59%

Based on data from January and April, 1982 (6031 accesses).

2.6 The Effect of Updating on Utilization

In the previous report we noted the apparent relation between level of use as measured by the average FAD score and the frequency of updating. Table 5 presents comparable data for the revised

TABLE 5

Average Number of Daily Accesses per Page and Updating Frequency, January - May, 1982

Category of Content	Average FAD Score	Frequency of Updating
Weather	2.2	Twice daily
Analysis	1.5	Daily
Mind Play	1.3	Daily
Performance	1.3	Daily
Bulletin Board	0.8	Daily/Weekly
On View	0.8	Weekly
For Kids	0.6	Weekly
Electro-Art	4.5	Weekly

service. With the exception of Electro-Art, a highly atypical one-page category consisting entirely of a graphic design, the data show that increased frequency of updating is associated with increased use.

Weather, which is updated twice a day, is accessed almost twice as often as those categories which are updated daily (Performance, Mind Play and Analysis). By the same token, Performance, Mind Play and Analysis are more heavily accessed than On View, For Kids and Bulletin Board which are updated weekly.

As mentioned in the previous report, one cannot assume unidirectional causality between frequency of updating and frequency of use, since the production team tended to update more frequently those categories that they expected to be more heavily accessed.

2.7 Frequency and Heaviness of Use

Figure 3 is a scatter diagram plotting heaviness of use (average number of pages accessed in April, 1982) against frequency of use (number of sessions during the month of April, 1982). We chose April because we collected attitude data during that period, so more detailed analyses can be made for that month.

In our analysis of the earlier service we noted two tendencies. In November, 1981, with the exception of a group of infrequent users, page accesses per session rose with session frequency up to use every other day. For the high frequency users beyond this point, the number of page accesses per session dropped.

In the April, 1982 analysis, the first tendency was also noted but not the second. This may have been due to the fact that there

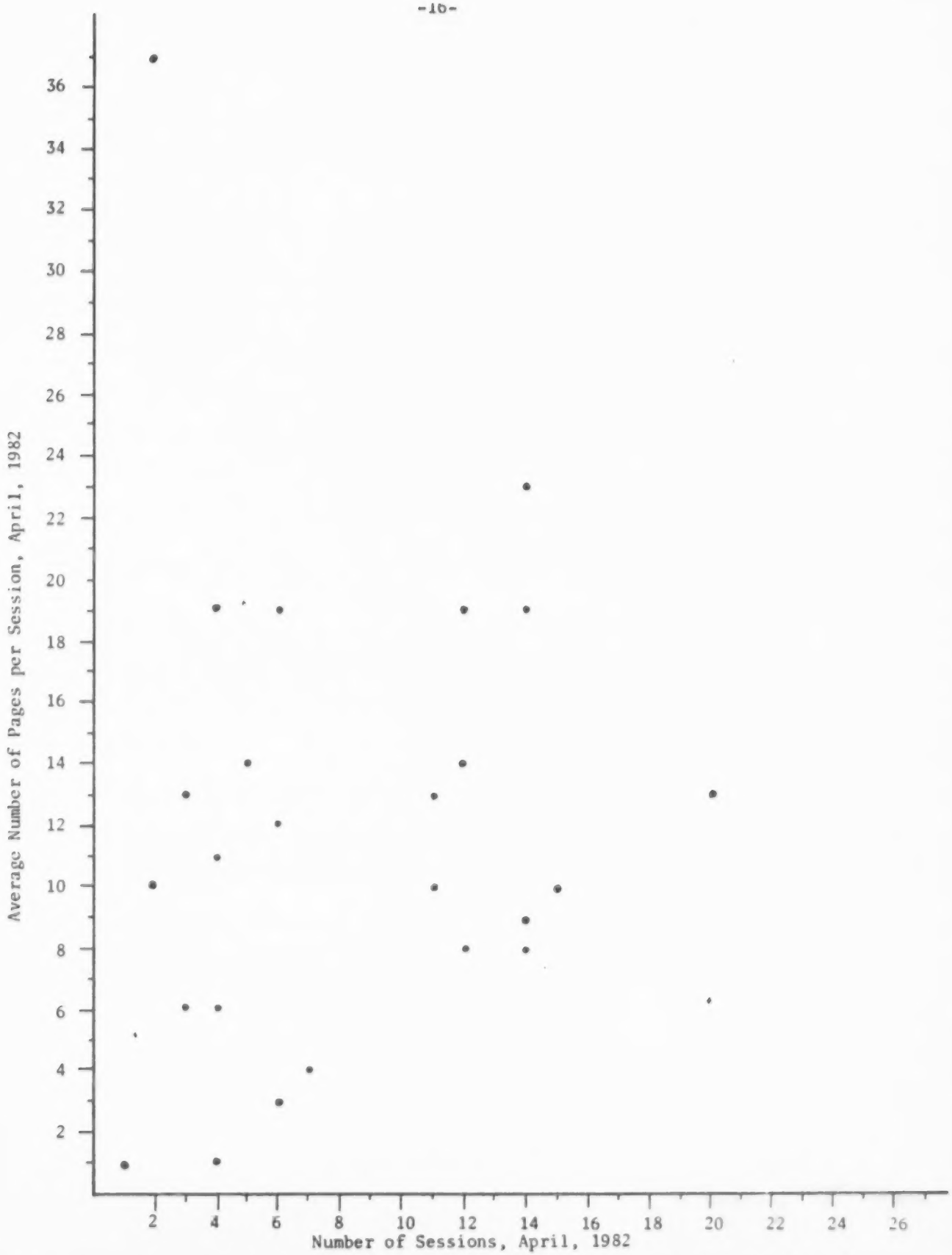


FIGURE 3: Heaviness of Use (Average Number of Pages per Session) by Number of Sessions, April, 1982

were fewer high frequency users in the new service.

2.8 Relation Between Use of Teletext and Use of Television

Figure 4 shows the average number of pages viewed per day plotted against the average number of hours of television viewed per day for each household in April, 1982. There was a suggestion of a pattern during the previous six months but there was no likely explanation for it. This time the data suggest no relationship between the two variables. Either no relationship exists or our measure of television viewing was inadequate.

2.9 The Primary User Within a Household

Table 6 presents data relating to the primary user within a household and the intensity of household teletext use. There is little difference between households according to whether the primary user is an adult male or an adult female. When the primary user is a child, use is higher than previously recorded. In the fall there was a slight indication that adult males were the primary users. It would now seem that children use the system more heavily though numbers are too small to allow statistical testing of this hypothesis.

The change in the primary user may be, to some extent, a result of content differences between the old and new systems. The categories News and Business, were dropped from the service in January, 1982. The new service focused more on cultural information; it also included a category "For Kids."

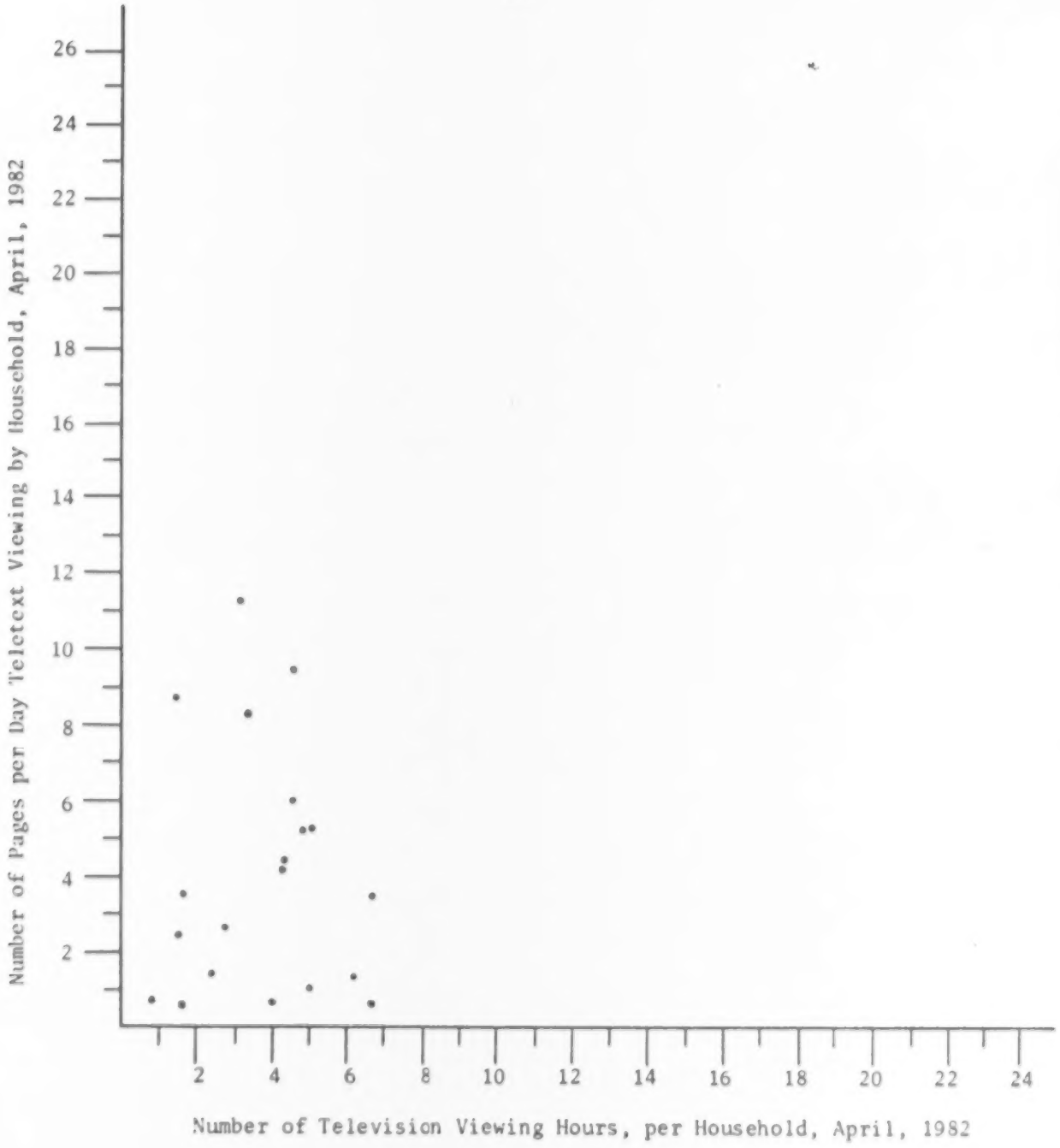


FIGURE 4: Average Number of Teletext Pages Viewed per Day by Average Number of Hours of Television Viewed per Day by Household, April, 1982

TABLE 6

Primary Household User of Teletext and Frequency of Household Use, April, 1982

		Number of Households at Each Level of Monthly Use			
Primary User	Number*	15+ Sessions	5-14 Sessions	1-4 Sessions	Unclassifiable
Adult Male	6	2	1	3	0
Adult Female	5	0	2	2	1
Child	8	2	4	1	1
All Equally	5	0	1	3	1
Total	24	4	8	9	3

*On the basis of a Chi^2 test with 3 degrees of freedom, there were no significant differences in frequency of use between the four categories of primary users.

3.0 ATTITUDES

In this section we summarize some of the results derived from the attitude questionnaire administered in April, 1982. The following information is presented:

- General attitudes toward teletext
- Attitudes toward different categories of content
- Relationship between attitudes and use of different categories of content
- Variation of attitude and use with reception quality
- Variation of willingness to pay for teletext with level of use of teletext

The last of these topics was not addressed in our earlier papers.

3.1 General Attitudes

3.1.1 Legibility. Virtually everyone found the text easy to read. Only 3 to 10% of the users experienced difficulty.

3.1.2 Graphics. The graphics were popular; in most categories the majority of viewers found them entertaining (54% on average). Only 7 to 13% of the respondents indicated that they wanted the graphics changed more frequently. In the Mind Play and Electro-Art categories, however, 20% and 27% of the subjects indicated that a more frequent updating of graphics would be desirable. Both of these categories were heavily accessed and it is possible that users grew tired of the graphics sooner.

Viewers were also asked whether the mix of graphics and text was about right. As Appendix 2 shows, reactions varied according to type

2.5
2.8
3.2
3.6
4.0
2.2
2.0
100 mm
A5
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890
1.0 mm
1.5 mm
2.0 mm
2.0
2.2
2.5
2.8
3.2
3.6
4.0
PG

of content. There was a tendency towards wanting a reduction in the use of graphics for Performance and On View, but an increase for Mind Play, For Kids and Electro-Art. There was no discernible tendency for Analysis, Bulletin Board and Weather; this may indicate that the mix was about right. Analysis and Bulletin Board used few graphics, while Weather made extensive use of them.

3.1.3 Response time. As in the fall, the main criticism of the service concerned page access time. 83% of the users indicated that they often felt frustrated waiting for teletext pages. Again, some respondents indicated a willingness to sacrifice graphics to obtain a faster response time. These results occurred despite the fact that the average page access time was reduced to about six or seven seconds from an average of more than ten seconds in the previous six months.

3.2 Attitude Towards Different Categories of Content

Response to four of the questions (numbers 3,4,7 and 8) formed the basis of an overall measure of attitude. The development of the attitude measure was discussed in the previous report. Since there were minor variations in the questionnaire the measure used here is discussed in Appendix 4.

Overall results are summarized in Table 7. Note that significant discrimination of the attitude measure occurred for two out of eight categories (For Kids and Weather). During the fall, significant discrimination was found for five out of nine categories. The difference between the two periods was expected since the previous service

TABLE 7

Overall Attitude to Teletext System Based on April '82 Questionnaire

	Overall Attitude				
Content Category	Positive	Mixed	Negative	Total	Chi^2
Performance	16(11)	5(7)	5(8)	26	3.97
On View	14(11)	7(7)	5(8)	26	2.96
Mind Play	10(11)	10(8)	8(9)	28	0.70
For Kids	6(10)	4(6)	14(9)	24	-6.77*
Analysis	7(11)	12(7)	8(9)	27	5.13
Bulletin Board	11(11)	10(7)	6(9)	27	2.29
Electro-Art	6(11)	6(7)	15(9)	27	-5.60
Weather	21(11)	6(8)	1(9)	28	+16.70**

Notes: (1) Overall distribution is (.41)+, (.27)+/-, (.32)-

(2) $X^2_{.90} = 4.61$; $X^2_{.95} = 5.99$; $X^2_{.99} = 9.21$

(3) Overall attitude based on questions 3,4,7.3-7.5 and 8 from April attitude questionnaire

was more information/content oriented while the current service is entertainment oriented. Consequently, one would expect that question eight, which dealt with the use of information, would show little discrimination. To test this possibility the questions were analyzed individually to determine which provided the best discrimination; the results are presented in Table 8.

Question 3 provides significant discrimination for six out of eight categories and in these cases results in a positive or negative attitude. Question 4 gives significant results for five out of eight categories and again provides discrimination between positive and negative attitudes. Question 7 had seven out of eight categories with significant discrimination; however in five cases these were neutral or mixed attitudes. Only Electro-Art and Weather were associated with negative or positive attitudes. Question 8 resulted in discrimination in only three out of eight categories all of which had neutral attitudes.

The combined results for questions 3 and 4 appear in Table 9. The overall attitudes are positive for five out of eight categories. (Performance, On View, Mind Play, Analysis and Weather) and negative for only two out of eight categories (For Kids and Electro-Art). There was no significant attitude (positive, mixed/neutral or negative) for Bulletin Board. This result is not surprising as Bulletin Board contained a mixture of topics.

3.3 Relationship Between Attitude and Use of Different Categories

Figure 5 shows the relationship between average FAD score (i.e., average number of daily accesses per page), attitude, and frequency of

TABLE 8

Detailed Attitude Breakdown for Teletext System Based on April '82 Attitude Questionnaire

	Q3, Timely/Useful					Q4 Most/Least Prefer					Q7 Value					Q8 Use				
Content Category	+	+/-	-	Total	X^2	+	+/-	-	Total	X^2	+	+/-	-	Total	X^2	+	+/-	-	Total	X^2
Performance	15	5	2	22	+22.00**	16	4	4	24	+6.00*	3	18	3	24	18.75**	11	7	4	22	0.93
On View	13	7	2	22	+15.01**	15	7	3	25	+9.34**	5	17	2	24	15.75**	8	9	6	23	2.83
Mind Play	8	10	6	24	0.67	16	6	6	28	+8.44*	4	15	5	24	11.25**	0	6	5	11	9.33**
For Kids	3	4	9	16	-7.19*	5	6	13	24	4.75	1	10	9	20	6.99*	4	6	5	15	2.53
Analysis	12	9	1	22	+10.20**	11	8	8	27	0.66	4	15	5	24	11.25**	5	8	5	18	3.56
Bulletin Board	9	9	3	21	4.36	12	8	6	26	1.55	8	11	5	24	2.25	6	10	5	21	7.27*
Electro-Art	4	3	11	16	-15.38**	7	3	16	26	-9.89**	1	9	14	24	10.75**	0	8	5	13	23.94**
Weather	22	5	1	28	+43.07**	21	7	1	29	+21.1**	22	5	1	28	27.67**	9	4	1	14	2.82

Notes: (1) + = positive attitude
+/- = mixed attitude
- = negative attitude

* - significant at .95
** - significant at .99

TABLE 9

Overall Attitude to Teletext Based on Questions Three and Four, April, 1982

Content Category	Result Q.3	Result Q.4	Overall Attitude
Peformance	+	+	+
On View	+	+	+
Mind Play		+	+
For Kids	-		-
Analysis	+		+
Bulletin Board			
Electro-Art	-	-	-
Weather	+	+	+

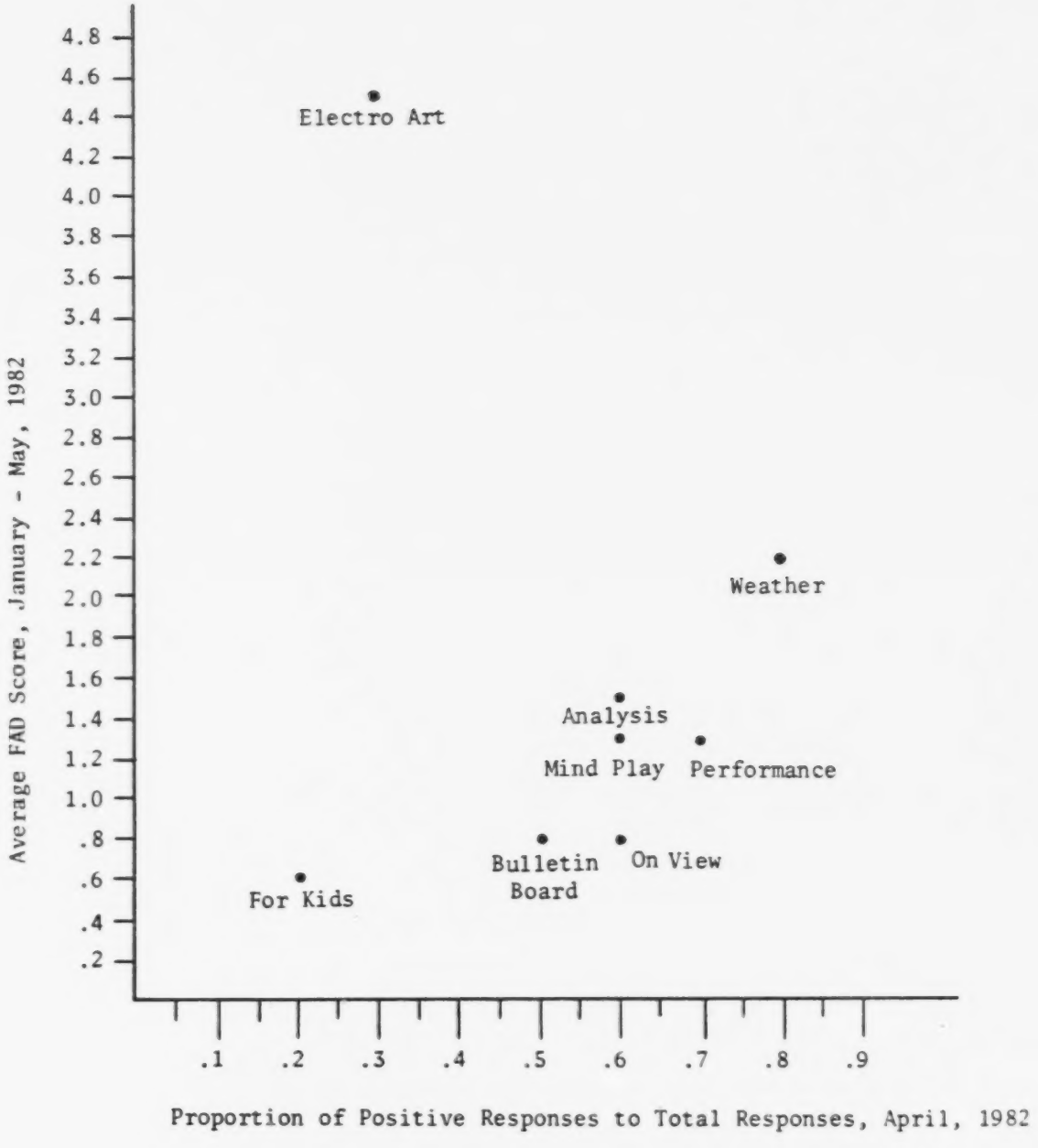


FIGURE 5: Proportion of Respondents with a Positive Attitude Versus Average FAD Score, by Content Category, April, 1982

updating. Excluding Electro-Art, the correlation between attitude and average FAD score for the remaining seven categories is 0.8 and is significant at the 0.975 level.

As noted in section 3.3 of the previous report, the relative use of any category can apparently be modeled accurately on the basis of (1) its number of active pages, (2) attitudes toward it, and (3) the frequency with which it is updated. There seems to be a closer correlation between attitude and frequency of updating in the 1982 service than was observed in 1981.

Electro-Art was the only category where use was much higher than would have been predicted. There are a number of factors which may account for this. Electro-Art was a one-page category containing a graphic design which often incorporated animation. Those who accessed the page generally did so several times in succession to replay the animation sequence. Further, certain households accessed the page quite heavily.

3.4 Variation of Attitude and Use with Reception Quality

As in the previous report (section 3.4) our engineer classified homes according to his perception of their reception quality: "Good" (36%), "Fair" (43%), and "Poor" (21%). The relationship between reception quality, attitude and frequency of use was explored. The results appear in Table 10. With the exception of those who had "Good" reception there is little discernible relationship. Those with "Good" reception showed a tendency to have a positive overall attitude toward teletext, though this was not reflected in the amount they used the service.

TABLE 10

Attitude and Use in Relation to Reception Quality

	Overall Attitude				Frequency of Use				
Reception Quality	Positive	Mixed	Negative	Total	High	Moderate	Low	Zero	Total
Good	6	3	1	10	1	3	4	2	10
Fair	6	5	1	12	1	8	3	0	12
Poor	1	3	2	6	1	4	1	0	6
Totals	13	11	4	28	3	15	8	2	28

As suggested in the previous report, the absence of a relationship may well be due to the coarseness of the measure of reception quality.

3.5 Willingness to Pay for Teletext

In this section data from questions 11, 12, and 13 of the April questionnaire are presented. We address the following issues:

- When the users plan to buy a new television
- How much they say they are willing to pay for a new set and for options such as remote control channel switching and teletext
- How much they say they are willing to pay for subscription teletext services
- Their willingness to pay in relation to their attitude towards the trial service and how heavily they used it

3.5.1 Purchase of a new color television. Of the thirty subjects interviewed, nine (30%) indicated that they would buy a new color television within the year; nine (30%) within one to two years and the remainder within two to twenty years. Those who planned to purchase a set within the year also indicated that they would buy a new set as soon as we removed our set. Several planned to purchase color sets after their experience with the teletext set. Only seven of the thirty respondents planned to spend more than $500 dollars for a new color set.

3.5.2 Purchase of a color television set with teletext. Over half of those surveyed (17 out of 30) indicated that they would pay nothing extra

to have a television set with a teletext capability. Of the remainder, five were willing to pay an extra $100, five would pay an extra $200 and the remaining three would pay $25, $50 and $300 respectively. In other words, 57% were unwilling to pay for teletext; 7% would pay only a nominal amount and 36% would pay $100 or more.

3.5.3 Perceived value of different types of service. Respondents were asked how much they would pay per month to subscribe to each of four possible teletext services.

(i) The January - May 1982 Service -- a more entertainment-oriented service

(ii) The June - December 1981 Service -- a more content/information oriented service

(iii) A text-only service -- no graphics

(iv) A decoder which could access several teletext services

The results are summarized in Table 11. Note that for those who were willing to pay, option iv was the most popular, while option iii was the least popular.

3.6 Willingness to Pay, Attitude and Level of Use

The relationship between willingness to pay, attitude toward teletext and level of use was investigated. The results appear in Table 12. Note that those who were willing to pay a moderate amount ($4 to $6 a month) were predominantly those with a positive attitude toward the service and a moderate level of use.

Results were aggregated on the basis of willingness to pay versus unwillingness to pay and appear in Table 13. Those with a

TABLE 11

Willingness to Pay for Different Types of Teletext Service

Type of Service	How Much They Would Pay ($/Month)					
	$0	$4	$6	$8	$10	$10+
(i) Similar to the January - May Service	43%	7%	23%	3%	13%	10%
(ii) Similar to the June - December Service	50%	3%	17%	0%	17%	13%
(iii) A Text-only Service	57%	3%	10%	3%	20%	7%
(iv) A decoder that could access several teletext services	30%	7%	13%	10%	17%	23%

(For each row n=30; entries sum to 100%)

TABLE 12

Willingness to Pay, Attitude and Level of Use

Willingness to Pay ($/month)	Attitude				Level of Use				
	Positive	Mixed	Negative	Totals	Heavy	Moderate	Light	None	Totals
0	3	5	3	11	1	4	4	2	11
4-6	6	3	1	10	1	6	3	0	10
8-10	1	2	0	3	0	1	2	0	3
10+	3	2	0	5	1	3	1	0	5
Totals	13	12	4	29	3	14	10	2	29

(Entries in cells are numbers of respondents)

TABLE 13

Aggregate Data Willingness to Pay, Attitudes and Level of Use

Willingness to Pay	Attitude								Level of Use							
	Positive		Mixed		Negative		Total		Heavy		Moderate		Light & Zero		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Not willing to pay	3	23	5	41	3	75	11	38	1	33	4	29	6	50	11	38
Willing to pay	10	77	7	59	1	25	18	62	2	67	10	71	6	50	18	62
Totals	13	100	12	100	4	100	29	100	3	100	14	100	12	100	29	100

positive attitude indicate a willingness to pay three times as often as those with a negative attitude (7% versus 25%). Those with a heavy or moderate level of use indicate a willingness to pay for teletext rather more often than those whose use is light (approximately 70% versus 50%). These results are reassuring--suggesting consistency among use, attitude and stated willingness to pay--but they do not allow us to assume a close relationship between stated and actual willingness to pay for teletext.

4.0 SOME IMPLICATIONS

In section 1.4 we listed some of the reasons why caution is needed in generalizing from our results. Since this paper covers only the last six months of residential use only a limited discussion of the findings is presented. The final conclusions, based on all residential data together with data from other sources will be presented in the final report.

In the remainder of this section we will consider the implications in four areas: design of VBI teletext service, technical design, methodological implications, and suggestive findings.

4.1 Design of a Service

Design implications will be considered vis-a-vis results derived from the previous service (June through December, 1981) as discussed in section 4.1 of the previous report.

4.1.1 Selection of content. In terms of use, Electro-Art, Weather, Analysis, Mind Play and Performance were the most successful categories. This is reasonably consistent with the findings of the previous report. Weather was heavily used in both services. Analysis compares roughly to News but was more oriented towards business, economic and political news. Mind Play, which consisted of puzzles, games and the like, was unique to the present service. Its popularity is not surprising in view of the general interest in games. Electro-Art, a one-page category, was a novelty since it presented a different electronic picture each week. It made use of Telidon's capability to provide a limited level of animation. This led some viewers to access it several times in succession.

In terms of viewers' attitudes, Weather, Performance, On View and Analysis were the most popular. Electro-Art was viewed negatively even though it received the most use. Too much should not be made of this point, however, because two of the four questions from which the attitude score was derived were directed toward the usefulness and timeliness of information. The Electro-Art graphics were popular but the designs could hardly be called useful or timely. It is also of interest to note that although children were primary users of the new service the section For Kids was the least used.

4.1.2 Variation during the day. As was the case with the previous service about half the use occurred during the evening. This result substantiates the conclusions drawn previously that:

1) Daytime use is sufficiently substantial to warrant attention.

2) There is a case for varying the content during the day.

3) Updating should be matched to the pattern of utilization over the day.

4.1.3 Variation over time. There was no noticeable novelty effect upon introduction of the new service. However, it is worth noting that, during week 44, there was a dramatic increase in use. This coincided with the final series of interviews.

4.1.4 Access time. Though the access time for the new service was substantially reduced it was still perceived as being too long. Since technical problems increased the effective access time, users' reactions may be as much a reflection of these problems as irritation with system access time per se.

4.1.5 Graphics. The high quality graphics were generally popular. Some light may be shed on the relative value of alphageometric versus alphmosaic graphics when the results of recent psychological studies have been analyzed. Graphics appear to have value when they aid understanding (i.e., a chart or graph) or illustrate the text in an entertaining manner.

4.2 Technical Design

Experience with the current service reinforce the conclusions drawn in the previous report. In summary these were:

1) The keypad design was awkward.

2) Reception problems, whether caused by geographical location, weather or technical difficulties, substantially affect the use of broadcast teletext.

4.3 Willingness to Pay.

About 40% of the users said they would be willing to pay something extra for a television with teletext capability. The option to suscribe to a teletext service for a monthly rental fee was generally more popular. A decoder that could access several services increases stated willingness to subscribe to teletext. As would be expected, those who are willing to pay seem to have a positive overall attitude toward teletext. There is also some indication, too, of the expected positive correlation between willingness to pay and level of teletext use.

4.4 Methodological Implications.

The methodological implications raised in the previous report are supported by our experience with the current service and will be discussed in detail in the final report. Three points are worth noting now. First, based on data from both services, there is a marked experimenter effect whereby the presence of an interviewer inflates use. Second, this effect is short-lived--one or two weeks at most. Third, these effects would be difficult to measure in the absence of meter data.

4.5 Suggestive Results.

The following tentative conclusions can be drawn from this initial analysis.

4.5.1 Utilization over time. While the data for the new service do not show increased use during the first weeks (a novelty effect) it is important to note that users were already accustomed to teletext. In general, it would be reasonable to expect that a new teletext service would experience a marked novelty effect during the first few weeks but thereafter use would stabilize at a lower level, even with changes in system content.

4.5.2 Use though the day. The pattern of use during the day established for the previous service was repeated for the new service. This supports our earlier suggestion that it would be desirable and feasible to adjust both content and updating to daily use patterns.

4.5.3 Frequency and heaviness of use. For the new service, there were fewer viewers who used teletext with a high frequency (e.g., at least every other day). This may be because the new service contained many fewer pages. An alternative explanation would involve fewer users per household.

4.5.4 Importance of frequency of updating. It appears that frequency of updating is likely to affect both attitudes to and use of a particular category of information.

4.5.5 Use of television and teletext. No evidence was found of a relationship between the use of teletext and the use of television. Assuming the two are indeed used independently (i.e., that the lack of evidence was not due to methodological problems with the measure of television use), the reason may be an artifact of the trial: the absence of a remotely controlled channel selector or reception difficulties. On the other hand, it is interesting that several subjects commented that they used teletext only to look something up.

APPENDIX 1

Teletext Publications of the Alternate Media Center

Working Papers from the Research Program:

No. 1 Elton, "Access Time and Reception Quality in the Field Trial in Washington, D.C." (September, 1981)

No. 2 Champness & Alberdi, "Measuring Subjective Reactions to Teletext Page Design." (September, 1981)

No. 3 Nisenholtz, "Early Use of Graphics in the Alternate Media Center/ WETA Teletext Trial." (December, 1981)

No. 4-5 Nisenholtz, "Early Experiences of Information Providers in the Teletext Field Trial in Washington, D.C." and Elton, "Labor Costs of Creating Teletext Pages." (February, 1982)

No. 6 Elton, Irving & Siegeltuch, "The First Six Months of a Pilot Teletext Service: Interim Results on Utilization and Attitudes." (September, 1982)

No. 7 Elton, Irving & Siegeltuch, "The Last Five Months of a Pilot Teletext Services Interim Results on Utilization and Attitudes." (October, 1982)

Other relevant publications:

Burns, "Technology is Not Enough."

Schober, "The Teletext Field Trial in Washington, D.C.: Technical Background and Issues." (Spring, 1981)

Siegeltuch, "Text On Screen and Print: A Comparison of Forms." (Fall, 1982)

APPENDIX 2

April Questionnaire and Statistical Summary

Note:
The distribution of responses is shown for all questions, except questions 12.2-12.4, 13.5, 17 and 18. Where the column totals are less than 100% the difference is accounted for by Null Responses

Teletext Questionnaire

April, 1982

ID#_____

Name_____

	PERFORMANCE	ON VIEW	MIND PLAY	FOR KIDS	ANALYSIS	BULLETIN BOARD	ELECTRO-ART	WEATHER
1) For which services would you prefer:	60%	57%	40%	30%	13%	47%	37%	60%
1.1) Many short 'blurbs' on a variety of topics	20	17	23	17	63	20	20	13
1.2) An 'In-Depth' treatment of a few topics								
2) For your needs, which service provides:								
2.1) Sufficent information	40	40	50	23	27	33	27	70
2.2) Too little information	30	30	13	17	43	33	20	20
2.3) More information than necessary	10	3	7	10	3	3	10	0
3) For which services do you find the content:								
3.1) Timely and useful	68	62	35	19	55	43	22	79
3.2) Timely but not useful	23	24	4	25	23	24	11	4
3.3) Useful but not timely	0	5	35	0	18	19	6	14
3.4) Neither timely nor useful	9	9	26	56	4	14	61	4
4) If you had a choice which service would you:								
4.1) Most prefer to continue to receive	67	60	57	21	41	46	27	72
4.2) Least prefer to continue to receive	17	12	21	54	30	23	62	34
5) Relative to other information sources available to you, for which service is Teletext:								
5.1) Easier to use	27	37	30	17	23	27	23	53
5.2) About the same effort to use	33	23	17	17	30	27	7	17
5.3) More effort to use	20	20	20	17	23	13	27	23
6) Check those services for which the content:								
6.1) Complements (adds to) information available elsewhere	50	50	27	20	37	33	3	30
6.2) Replaces information available elsewhere	3	3	7	7	17	7	0	17
6.3) Duplicates information available elsewhere	20	17	13	10	30	20	10	37
6.4) Is generally not available elsewhere	0	7	17	10	3	3	47	0
7) For which services do you find:								
7.1) That the content is easy to read	70	77	67	53	73	70	57	87
7.2) That the content is difficult to read	10	10	7	10	10	3	10	3
7.3) That the content is of little value	13	21	17	5	17	33	4	10
7.4) That the content is of some value	74	71	63	50	63	46	38	52
7.5) That the content is quite valuable	13	8	20	45	20	21	50	38
7.6) That the graphics are entertaining	63	50	53	46	37	30	57	63
7.7) That the content is entertaining	23	27	46	17	20	27	23	23
7.8) That you want the graphics changed more frequently	13	13	20	10	7	7	27	13
7.9) That you want the content changed more more frequently	20	20	17	10	20	33	13	27
7.10) That you want to see more graphics	13	10	20	17	7	7	23	17
7.11) That you want to see less graphics	20	17	7	7	13	13	3	13
8) For which services have you:								
8.1) Used the content to do something? Eg; choose a show, locate a sale, etc.	50	30	0	27	6	24	0	44
8.2) Called or written for more information	0	5	0	0	17	4	0	0
8.3) Found the content interesting but haven't used it	32	39	55	40	44	48	62	29
8.4) Found the content boring	18	26	45	33	29	24	38	17

BEST COPY AVAILABLE

9) How many years ago did you purchase your last TV set?	0-1	1-2	2-4	4-6	6-8	8-10	10+	N/A
		3%	13%	20%	7%	17%	7%	7%	3%
Color----------	□	□	□	□	□	□	□	□
B & W----------	o 7	o 13	o 7	o 17	o 10	o 3	o 13	o 0

10) How much did you pay for the TV?	$100-200	200-400	400-600	600-800	800+
Color----------	□ 0	□ 50	□ 23	□ 0	□ 0
B & W----------	o 60	o 10	o 0	o 0	o 0

11) In how many years do you expect to buy a new Color TV set?----------	0-1	1-2	2-4	4-6	6-8	8-10	10+	Never
	□ 30	□ 30	□ 10	□ 17	□ 7	□ 3	□ 3	□ 0

12) When you buy a new TV, how much would you be willing to pay for:	$500	600	700	800	900	1000	$200-300	$400
12.1) A standard Color TV set-------	o 63	o 17	o 3	o 0	o 0	o 3	o 10	o 3
12.2) A Color TV set with a Remote Control----------	□	□	□	□	□	□	□	□
12.3) A Color TV set with Teletext--	o	o	o	o	o	o	o	o
12.4) A Color TV set with Remote Control and Teletext----------	□	□	□	□	□	□	□	□

13) If we were to continue the current service by supplying a decoder for your TV set:	$0	$4	$6	$8	$10	$12	$14	$16	$18	$20
13.1) How much would you be willing to pay per month -----	43 o	7 o	23 o	3 o	13 o	3 o	7 o	0 o	0 o	0 o
13.2) How much would you pay for a service like that offered in November/December----------	50 □	3 □	17 □	0 □	17 □	7 □	3 □	3 □	0 □	0 □
13.3) How much would you pay if the service were Text only--------	57 o	3 o	10 o	3 o	20 o	3 o	3 o	0 o	0 o	0 o
13.4) How much would you pay if the decoder could recieve several Teletext services----------	30 □	7 □	13 □	10 □	17 □	7 □	3 □	3 □	3 □	7 □
13.5) Other (describe) ----------										

----------	o	o	o	o	o	o	o	o	o	o

14) Who in your home:

14.1) Uses Teletext the most-------

name	relationship
Adult Male 20%	
Adult Female 17%	
Children 27%	
Equally 20%	16% Single Adult Households

14.2) Uses Teletext the least------

Adult Male 37%	
Adult Female 33%	
Children 7%	

15) Are there specific times when you and your family tend to watch Teletext----------

O Yes 60% O No 33%

If yes, when----------

time	weekdays	weekends
Morning	13%	10%
Afternoon	0%	7%
Evening	60%	37%

16) Do you get frustrated waiting to receive Teletext pages----------

O Yes 83% O No 13%

Other _____

17) What are your favorite pages-------

name	page #

18) Additional comments----------

APPENDIX 3

The April Teletext Diary

INSTRUCTIONS FOR

TELETEXT DIARY

ID#:_____ Date Begun:_____

Please record your household's use of Teletext using this diary.

Keep it by your Television for 7 days starting the day you recieved this diary.

During this period, ask all members of the household to fill in the diary whenever they use Teletext.

Fill out the diary each time the TV set is switched to Teletext, using as many sheets as necessary to record all pages viewed.

An example is described on the following pages. If you have any questions about using the diary, please call 703-998-2771.

THANK YOU FOR YOUR COOPERATION

EXAMPLE

TELETEXT DIARY

Please answer all questions

1. Please circle day of week — M (1) Tu (2) W (3) Th (4) F (5) Sa (6) Su (7) — (7)

2. Time switched to Teletext — AM ☐ PM ☑ — Hours 10 Minutes 45 — (8)(9)(10)(11) — (8-11)

3. Please record the numbers of all pages accessed (continue on next sheet if necessary)

(12-15)	(16-19)	(20-23)	(24-27)	(28-31)	(32-35)	(36-39)	(40-43)	(44-47)	(48-51)
0	10	11	11.1	13	26	50	60	61	611

(12-51)

4. Time switched off Teletext — AM ☐ PM ☑ — Hours 10 Minutes 55 — (52)(53)(54)(55) — (52-55)

5. Please circle the TV Channel watched:

A) Just prior to using Teletext: None Other 2 4 5 7 9 (11) 13 20 26

B) Just after using Teletext: (None) Other 2 4 5 7 9 11 13 20 26

	Section 1		Section 2 Age in Years				
	Male	Female	Under 10	10-15	16-20	Over 20	
6.A) Main person watching Teletext (check one in each section)	○	☑	☐	☐	☐	☑	(58-59)
B) Others who were also watching (check as many as appropriate)	☑	☑	☐	☐	☑	☐	(60-65)

7. What was the main reason for watching Teletext? (Check only one)

- I usually watch it now ☐ (66)
- To fill in time during commercials ☐ (67)
- While switching channels ☐ (68)

(66-71)

- Only for amusement ☑ (69)
- To get specific information ☐ (70)
- To get general information ☐ (71)

Problems with the Diary?
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EXAMPLE

The TV was switched to Teletext on Friday at 10:45 pm. The main index page was accessed, then the viewer went to the News section and viewed pages 10, 11, 11.1 and 13.

Though they recorded other pages note that the main reason for using Teletext was for amusement.
Also note that they may have viewed other pages after 61.1; if so these pages would be recorded on the next sheet(s).

The users were watching channel 11 prior to using Teletext. When they finished they turned the set off; indicating this act by circling 'None' in response to 5B (had they turned to a channel not listed they would have circled 'Other').

The main person watching was female and over 20. The others who were also watching were Males and Females between 16-20.

You will find it easiest to fill out this diary as you use Teletext rather than waiting till later to complete it.

THANK YOU

APPENDIX 4

Derivation of the Measure of Overall Attitude

We wished to determine for each respondent whether he or she had a positive, mixed or negative attitude overall towards each category of content. This appendix describes the method we used.

The method was based on answers to questions 3,4,7.3-7.5, and 8 in the questionnnaire (Appendix Two). Question 3 referred to timeliness and usefulness of each category. Question 4 concerned the most and least preferred categories. Question 7 (parts 3,4 and 5) asked about perceived value and question 8 was concerned with whether the information had triggered action.

Overall were allocated in accordance with the following table. The most frequent response always determined assignment to the appropriate attitude category (positive, mixed, neutral). Ties were resolved using the following rules:

(i) a + response canceled a - response resulting in an assignment to the mixed category.

(ii) a + single or a - single response dominated a single + or - response resulting in an assignment to either the positive or the negative category.

Question	Response to the Question	Score for any Category Receiving the Response
3	3.1	+
	3.2	+/-
	3.3	+/-
	3.4	-
4	4.1	+
	4.2	-
7	7.8	-
	7.9	+/-
	7.10	+
8	8.1	+
	8.2	+
	8.3	+/-
	8.4	-